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HEPATIC PHYSIOLOGY AND PATHOLOGY FROM THE SURGICAL VIEWPOINT*

A Review of Experimental Investigations

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IT IS with much apprehension that I attempt to present this third Judd Lecture. When Doctor Judd, in his quiet way, invited me to give this lecture, I misunderstood him and, under the impression that he desired me to fulfill a lecture appointment here at the University which he was unable to fulfill himself, I readily assented. Not until I received a letter from Doctor Wangensteen, to whom I also owe much for this honor, did I realize that I had been invited to give the Judd Lecture. I then discussed the question with Doctor Judd in regard to the advisability of an experimental investigator, who must by necessity present a subject of possibly only academic interest and at best of doubtful clinical importance, giving the lecture which, on the two previous occasions of its presentation, had been of such predominant clinical interest and surgical importance. Doctor Judd assured me that he and Doctor Wangensteen had agreed that the lectureship should sponsor experimental as well as clinical research in subjects of surgical significance and that he personally would like to have some of the results of the investigations which my associates and I had been doing in regard to the liver presented as a Judd Lecture.

Owing to Doctor Judd's preëminence in clinical surgery it has probably never been realized that he also took a keen interest in experimental surgery and research. The second day after I was given the opportunity of having the direction of the new surgical research laboratory at The Mayo Clinic, Doctor Judd came to see me. This was the second time I had met him. At this time he emphasized the importance of learning more about the physiology and pathology of the biliary tract and stated his belief that experimental research would be necessary to solve some of the problems confronting the surgeon in regard to this important structure. How well the history of the recent advances in knowledge of the biliary tract has borne out his belief! He suggested that we begin by observing the effect of removal of the gallbladder on the remaining portion of the extrahepatic biliary tract. From that time until the present, each year, some problem on the biliary tract has been investigated by my associates or myself. Doctor Judd always took a keen personal interest in the problem under investigation and with the spirit of the true scientific investigator accepted the results of the research, regardless of how they might affect his preconceived ideas on the problem.

For many years Doctor Judd, accompanied by his surgical assistants, visited the Institute of Experimental Medicine each Thursday forenoon. Only his enforced absence from Rochester would prevent his making this weekly visit. Those of us working in the laboratories at the Institute made the practice of planning our work so that we could demonstrate the various phases of our researches to our visiting colleague. These demonstrations were presented in the form of an informal clinic with much free discussion. Doctor Judd brought to these conferences a clinical viewpoint which was exceedingly valuable and stimulating to those of us doing experimental research. His primary interest in his visit to the

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Institute, as would be anticipated, was in experimental surgery. He would first visit the operating room where the various operations performed as a necessary prerequisite for our researches were being done. After completion of the operative work we would go to one of the other laboratories where the results of some of the various investigations in progress would be presented and discussed. While he was interested in everything we were doing, he evidenced the greatest interest in our researches on the functions and pathologic reactions of the liver. In his consideration of the results of these investigations on the liver Doctor Judd attempted to find correlations with, and applications to, his clinical problems. When, as usually happened, a direct application of the experimental findings to his clinical problem could not be obtained, he reviewed his clinical data more carefully to determine if a combined approach by the clinical and by the experimental investigator could be discovered.

It seemed to me that I could accomplish best what Doctor Judd had in mind when he and Doctor Wangensteen honored me with the invitation to present this lecture, by reviewing the problems concerning the liver which we discussed for so many years at our informal conferences. Since Doctor Judd's interests were so intensely surgical in nature, the phases of hepatic functions and reactions discussed were mainly those which perchance might have a surgical import. Accordingly I will attempt to maintain this viewpoint. The subject matter I wish to present is not new, but consists mainly of a review of the results of various investigations by my associates and myself.

In the first Judd Lecture the pituitary was presented as the master gland of the body, emphasizing that it apparently initiates and controls many of the important functions of the organism. I should like to leave with you the exactly opposite characterization of the activity of the liver. The liver is the servant of the body. From the time in fetal life when it first has imposed on it a blood supply over which it has little or no control until its activity ceases with that of the body, it is the physiologic drudge, constantly responding, often at the expense of its own cellular constituents, to the demands and needs of the rest of the organism.

The Importance of the Liver to Surgery

If I were faithfully to present a summary of the numerous discussions between Doctor Judd and those of us investigating the liver, it would consist mainly of questions and problems which at present are unanswerable. However, such a summary would emphasize not only the present inadequacy of knowledge concerning the organ, but also the potential significance of hepatic functions and reactions to surgery. The liver is of great surgical significance because of its important and manifold physiologic activities. Since the liver is either directly or indirectly involved in so many physiologic processes, it is obvious that many of the sustaining efforts of the organism when diseased, and the physiologic compensations made necessary by operation, involve the liver. From the time the patient enters the operating room until he is dismissed from the hospital, the hidden and often unappreciated activities of the liver are probably just as important in maintaining the life of the organism and in making for a successful outcome of the operation as are the functions of other organs, such as the heart, kidneys, and so forth which are observed so carefully by the surgeon. Probably the reason why the surgeon does not consider the liver in the same manner is not only because knowledge of its functions is as yet so scant and methods of observing them inadequate but also because the organ apparently does its work so well even under very adverse conditions.

The Physiologic Anatomy of the Liver

The liver, like other organs of the body, has certain anatomic features which are obviously of physiologic import. While its well known anatomic position, gross appearance, and relationship to other organs are worthy of serious consideration, they are not pertinent to the present subject. It should be noted, however, that in many species of animals the lobes of the liver are separated sufficiently to permit their successful removal surgically. This anatomic fact admits of investigation of the effects of partial removal of the organ. While in the human being the division into lobes is incomplete, the organ can almost be considered as bilateral as it is separated almost completely into two portions on the basis of vascular and duct radicals.

Its large size appears indicative of not only its manifold physiologic activities, but also of its capacity as a storehouse. Since hepatic tissue is exceeded in amount by only one other homogeneous tissue in the body, the voluntary muscle, hepatic activity must always be considered as a possibility in the maintenance of those mechanisms of the body which depend at least to a considerable extent on mass of tissue, such mechanisms as those concerned in maintenance of the reaction and amount of circulating fluid, production of energy for heat, storage of elaborated substances, and so forth.

The liver has a double blood supply. The blood reaching it through the hepatic artery is arterial in nature, is under the usual arterial pressure, and serves to supply the organ with oxygen in the same manner as the blood which passes to the other organs of the body. The arterial blood flow to the liver is under vasomotor control and is essential for the existence of the organ. The blood reaching the liver through the portal pathway, much larger in amount than the arterial blood, is venous in character, having already passed through one capillary bed, and has had added to it the many substances absorbed from the gastro-intestinal tract as well as those leaving the pancreas and spleen. The amount of blood flowing through the portal vein is under the control of the vasomotor mechanism of the first capillary bed it traverses and since stagnation of blood in the portal vein would be a serious condition, there is very little inhibiting control of the blood flowing through this pathway in the liver. The blood reaching the liver through the two vascular channels mixes before it arrives in the hepatic vein but the exact site at which this mixing occurs remains one of the unsolved anatomic-physiologic problems concerning the organ.

The liver receives nerves from both the sympathetic and parasympathetic systems, but the former are in greater abundance. Most of the nerves reach the liver by accompanying the hepatic artery and seem to be mainly for the purpose of controlling the blood flow through this artery. Section of the nerves to the liver has not produced a significant change in the functions of the organ so far studied. Evidence in regard to the distribution of the nerves in the liver is contradictory and it must be concluded that a direct relationship between the nerve fibers and the hepatic cell has not been demonstrated.

The large supply of lymphatics leaving the liver denotes the importance of the organ in the formation of lymph. However, recent work would indicate that the liver is not as important in this respect as was formerly thought. It is questionable whether any special importance should be attached to the rôle of the liver in the formation of lymph and the process of lymph formation in this organ, as in other organs of the body, is probably only a necessary adjunct to its physiologic activities. The site and manner of origin of the lymphatics in the liver have not been definitely determined.

The liver possesses a simple histologic conformation which is amply suited for the interchange of many substances between the hepatic cell and the blood, as well as for the elaboration of an external secretion. Aggregates of hepatic cells forming small units have been described as portal lobules or as hepatic lobules, depending on whether primary consideration is given to the external or to the internal secretion of the liver. In view of the subordination of the bile-secreting function in relation to the numerous other hepatic functions associated with the transfer of substances between the blood and the liver, to consider these cellular aggregations to be hepatic lobules is preferable to considering them to be portal lobules.

The liver contains cells of three specific types: the hepatic cells, the stellate cells, and the cells of the biliary duct system. The last are typical duct cells and serve to surface the intrahepatic biliary ducts. The stellate or Kupffer cells partially line the sinusoids of the liver and are included in the reticulo-endothelial system because they remove the same type of foreign bodies from the blood stream as the cells of this system situated in other regions, such as the spleen and bone marrow. These cells have very important functions, but it has not been proved that the stellate cells function in a manner any different from that of the same type of cells in other tissue. The hepatic cell is the cellular constituent of the liver which is responsible for the majority of the functions of the organ. These are situated in the radiating trabeculæ which make up the lobule. They are character-

istic in shape and variable in size. They are constantly changing, depending on their physiologic activity.

One of the most important structural characteristics of the liver is the arrangement of the supporting tissue of the organ. The liver is completely invested with a thin covering of connective tissue which extends throughout the organ, forming a more or less complete wall around the lobules and a supporting framework for the cords of hepatic cells. The arrangement of this supporting tissue is so definite, constant and characteristic in the normal organ that it presents an unvarying pattern to which changes attributable to pathologic processes in the organ can be compared. Changes in the hepatic pattern furnish one of the best criteria of pathologic processes that have occurred and studies of the changing pattern of the liver in hepatic disease have demonstrated some of the causes and limitations of hepatic reaction.

Hepatic Functions

A very important general physiologic characteristic of the liver is its great variability in activity. The nature of many of its functions would indicate that it has a dynamic, not a static character. There is often an extremely rapid change in the rate at which it maintains its various functions. Furthermore, a few of the physiologic processes in which the liver has an integral part are completed wholly by, or within, the organ. This fact, together with the variability in functional activity and capacity, has an important bearing in regard to quantitating hepatic function by tests.

The most important known functions of the liver have to do with metabolism. The liver appears to be essential for certain phases of the metabolism of each of the major foodstuffs. In general the function of the liver in relation to metabolism is to make constantly available in ample quantity readily utilizable food for the body, regardless of the rate at which food reaches the body or the rate at which it is metabolized.

The liver stores carbohydrates in the form of glycogen and manufactures glucose from other substances. It regulates the concentration of glucose in the blood, making possible a constant amount of fuel for the other tissues of the body, particularly the muscles. If this function of the liver fails, hypoglycemia, with its resulting fatal issue, occurs. Some procedures and substances stimulate the liver to give the blood an abnormal amount of glucose, and hyperglycemia results. The liver is probably always involved either directly or indirectly in hyperglycemia or hypoglycemia.

While the liver appears to be a storehouse for protein, its most important activities in relation to this foodstuff are the deaminization of the amino-acids and the formation of urea. In the former process it manufactures glucose from protein and in the latter it makes the waste portion of the amino-acids into a substance readily excreted from the body. In addition, the liver changes uric acid to allantoin in those species of animals in which uric acid is not excreted unchanged in the urine.

The relation of the liver to metabolism of fat is unknown, but there appears to be no question that it does have a part, probably an essential one, in the metabolism of this foodstuff. At any event, the organ is a storehouse for fat, as is evidenced by the fact that on a diet of fat, the fat content of the liver may reach as high as 40 per cent of the total amount of hepatic tissue. The fat content of the liver is extremely variable, depending on many factors, some of which are known. The fat and glycogen in the liver bear a reciprocal relation to each other, and only under special conditions is the content of each high in the organ at the same time. The fat content of the liver increases in a few physiologic states and after the administration of substances which injure the organ. Recent work has indicated that choline is of importance in mobilizing the fat in the liver.

Hepatic activity is involved in the metabolism of some of the inorganic elements of the body, particularly minerals. Minerals are excreted in the bile and the hepatic tissue contains a varying amount of inorganic material. The significance of these facts is not known. The stellate cells appear to contain larger amounts of inorganic substances than the hepatic cells. The stellate cells often contain a large amount of iron which is derived from hemoglobin. Hemoglobin is taken up by the stellate cells as well as by the reticulo-endothelial cells situated in other tissues of the body, disintegrated, the iron retained in the cell and bile pigment formed from the pyrrole portion of the hemoglobin molecule.

The liver is also a factor in the metabolism of water, although the extent and significance of its activities in this respect are not known.

The best known function of the liver is the secretion of bile. Knowledge in regard to the mechanism of bile secretion is not complete. It is known that, differing from the other glands that pour their secretions into the gastro-intestinal tract, the liver secretes bile more or less continuously although the rate of secretion varies. Some of the variability in rate of secretion of bile is owing to the changes in activity of the gastro-intestinal tract associated with the intake of food, but for the most part the causes of the changes in rate of secretion and concentration of the constituents of bile are not known. Bile has three main constituents: cholesterol, bile pigment and bile acids. Very little is known concerning the relation of the liver to cholesterol. Bile pigment, as previously stated, is formed from hemoglobin in the cells of the reticulo-endothelial system and is excreted as a waste product in the bile. The bile acids are not only made in the liver, but may be destroyed there. They are important in the absorption of fat and possibly of certain vitamins.

The liver is an important factor in protecting the body from many injurious agents. The manner by which the liver accomplishes this is, for the most part, not understood. Some formed substances, such as certain bacteria, are removed from the blood stream by the stellate cells. Many other substances, carried in solution in the blood, are possibly absorbed or destroyed by the hepatic cells. Definite proof that the liver protects the body by absorption of toxic substances is lacking, but there are some suggestive observations in this regard. Certain poisons, such as chloroform and phosphorus, injure the liver more than any other organ of the body. This fact has been interpreted as evidence that the liver exerts a protective action, in which it becomes injured in protecting the remainder of the body by absorbing more than its share of the injurious substance. In a few instances it has been proved that the liver specifically destroys an injurious substance. Certain alkaloids, such as strychnine and nicotine, are for the most part destroyed in the liver. It has also been proved that the effect of many substances, which more or less specifically injure the liver, depends on the physiologic status of the organ at the time the poison reaches it. A liver rich in glycogen is more resistant to most of these injurious agents than a liver poor in glycogen.

The liver has many functions less understood than those mentioned. It is probably the site of origin of the plasma protein or of the substances from which these proteins are made. It appears to be an organ that is essential for some of the factors necessary for the coagulation of blood, being the probable site of origin of both the fibrinogen, or its precursor, and of some of the prothrombin. The liver elaborates one known substance, heparin, and is at least the storehouse for another very important substance, the factor essential in the treatment of anemia.

Pathologic Reactions of the Liver

The liver has a few fundamental characteristics which are of great importance in the development of some of the pathologic lesions of the organ. Chief of these characteristics is the capacity of the liver to be rapidly restored after injury or partial removal. Much of the hepatic tissue can be injured by a toxic substance and complete restoration will occur within a short time. Three-fourths of a normal liver can be removed without permanently reducing the total amount of hepatic tissue.

This capacity of the liver for restoration can be injured or abolished by loss of the portal blood to the organ, by prevention of the secretion of bile and by repeated injury with some toxic substances. In this regard the importance of the portal blood flow through the liver should be emphasized as the loss of this portion of its circulation appears to be a most important factor in decreasing the restorative ability of the organ. When the capacity for restoration is injured, it is possible greatly to reduce the amount of hepatic tissue.

There are numerous methods for producing pathologic lesions of the liver experimentally and it is possible to produce hepatic lesions which are the counterpart of some of the pathologic conditions of the organ as seen in the human being. Experimental investigations have demonstrated some of the causes of the vulnerability of the liver to certain toxins, the character of the hepatic reaction to injury and a few of the factors necessary for restoration, loss of which leads to a permanent pathologic state.

Experimentally it has been difficult to distin-

guish between the physiologic and pathologic fatty changes in hepatic tissue. An excess of fat in the diet, or fasting, will greatly increase the fat content of the liver. The addition to a fat diet of a substance such as alcohol, which produces a slight but definite pathologic condition of the liver, will greatly accelerate the accumulation of fat in the liver. Diversion of the portal blood from the liver or removal of the pancreas will increase the histologically demonstrable fat in the organ. Almost all of the toxic substances which injure the liver will change the amount of demonstrable fat in the organ. It has not been possible to distinguish, by histologic studies of the fat alone, between the changes in the fat in physiologic and in pathologic states.

In simple trauma to the hepatic tissue the stellate cell appears to be the most responsible agent in the process of healing. These cells come from adjacent regions and accumulate around the injury, wall it off and permit unmolested restoration.

When the secretion of bile is prevented, the hepatic parenchyma is gradually destroyed but biliary cirrhosis usually does not develop, although there is a marked difference in species of animals in this respect. In some species of animals, such as the rat, a seemingly true biliary cirrhosis occurs following occlusion of the hepatic duct.

Infection of the biliary tract, such as usually occurs when the bile is drained artificially into the gastro-intestinal tract by anastomosing the gallbladder and intestine or by implanting the common bile duct into the stomach or intestine, is followed by an atrophic cirrhosis which progresses until death occurs. This is the only type of cirrhosis produced experimentally, progress of which cannot be stopped.

There are many toxic substances which more or less specifically injure the liver. Recovery of hepatic tissue from a non-fatal dose of these substances is usually rapid and complete. Repeated administration of many of these substances rarely will cause the resulting lesion to progress beyond the acute stage. However, the repeated administration of a few of the hepatotoxins will readily produce characteristic cirrhosis. Progression of the lesion depends on the constant administration of the toxin. As soon as administration ceases, the lesion either remains stationary or more often a considerable degree of recovery occurs.

Many factors appear to affect the rate of development of, and the character of, a hepatic lesion. Mention has been made of the importance of the physiologic state of the liver in relation to the extent and character of pathologic reactions. In this connection it should be noted that the liver undergoes definite cyclic changes each twenty-four hours. These changes are related to the ingestion of food. The weight of the liver begins to increase soon after taking of food, reaches its initial maximum in about six hours, decreases transitorily, and then again increases to a level as high as, or higher than, the initial one, followed by a decrease to the fasting value. Thus the curve is definitely bimodal in character. Chemical analysis of the better known constituents of the liver shows that the concentration of these substances follows similar rhythmic variations.

Diet is one of the most significant factors which appear to affect the rate of development and character of a hepatic lesion. An animal with complete obstruction of the biliary outflow will not infrequently live many months if maintained on a carbohydrate diet, while the length of life of an animal in this condition and receiving a meat diet is usually only a matter of weeks. An animal which is receiving a standard amount of carbon tetrachloride and a carbohydrate diet will be alive and in good condition many months after its kennel mate, receiving the same amount of drug but a meat diet, has died. While in both instances a definite hepatic lesion will develop, when the diet is of meat the pathologic process develops very much more rapidly and is more severe. If an animal is receiving a fat diet, the fat content of the liver will increase, but if alcohol is administered with the fat not only will the store of fat in the liver increase much more rapidly with the same amount of fat in the diet, but the general effects of the alcohol are much greater than if the animal had been receiving a carbohydrate diet. Other instances could be given, showing the dependence of hepatic activity on the reaction to diet.

As previously mentioned, the hepatic pattern, that is, the architecture of the organ, as visualized by delineation of the supporting tissue of

the organ, is a most important histologic characteristic of the liver. A very valuable method of studying the development of a progressive lesion of the liver is to make successive observations in regard to the changes in pattern of the organ. When a single non-fatal dose of a hepatotoxin is administered the resulting lesion usually heals completely without any permanent change in hepatic pattern resulting. However, with repeated administration of the toxic substance, the pattern of the liver is not restored to normal and cirrhosis develops. A study of the change in hepatic pattern during the development of the lesion not only makes it possible to visualize the manner in which the liver reacts to injury, but makes possible the interpretation of many of the features seen in the fully developed lesion.

It is not possible in the scope of this talk to give a complete picture of the process of development of cirrhosis, but the pertinent facts determined by a study of the hepatic pattern can be presented. The most important change in the pattern of the liver that occurs after repeated injury to the hepatic lobule is the failure of restoration of the normal vascular relationship. Since restoration of hepatic tissue appears to depend in a great measure on the flow of portal blood, one of the important factors limiting the continued restoration of hepatic tissue after injury is the failure of establishment of the normal vascular relationship in the repeatedly injured hepatic lobule. A small portion of the large increase in the supporting tissue in cirrhosis is owing to the formation of new connective tissue, stimulated by the exciting agent and the resulting products of injured hepatic tissue. But most of the increase in the tissue constituent in cirrhosis, which has given origin to the name of the condition, is made up of the remains of the supporting framework of the lobules which have been destroyed. A new supporting framework is formed to support the hepatic cells in each attempt at restoration of the lobule and after each repeated injury the supporting tissue is shoved aside by the new attempt at regeneration and accumulates as more or less dense bands around the regenerating portion. In some regions of the cirrhotic liver there are accumulations of bile ducts which appear to indicate an overgrowth of these structures. In some specimens large bile ducts are found on the surface of the organ. A study of the hepatic pattern shows that these bile ducts, like the supporting tissue, are the remains of lobules and of whole portions of the liver which have been destroyed in the process.

Function of the Permanently Injured Liver

Since the surgeon is usually dealing with individuals who are afflicted with a pathologic condition he is more interested in the physiologic activity and capacity of the diseased liver than in the normal organ. Experimental investigations have added to knowledge concerning the physiologic status of the permanently injured liver but such knowledge is not of great practical value to the surgeon at present. It has been learned that there is a dissociation of functions of the liver; that is, a pathologic condition may injure one function of the organ to a much greater extent than its other functions. It has also been discovered that whereas loss of all the hepatic tissue may totally stop several important physiologic processes, decreasing hepatic tissue, either of the normal organ or of an organ in which cirrhosis has been produced, does not decrease these functions a measurable amount. It would appear that only a small amount of hepatic tissue, even if pathologic processes have occurred in it, is necessary to carry on all the functions of the organ. While it would appear that since the liver has so many functions it would be possible to measure some of them, so far it has not been found possible to quantitate any one of them.

Significance of the Liver to Surgery

It is difficult and often impossible to apply the known facts concerning hepatic physiology and pathology to the problems in which the surgeon is interested. A few examples can be presented to illustrate the potential importance of the liver to surgery.

While the importance of the character of food in relation to the liver has been repeatedly mentioned, it is of such particular significance in the consideration of the present subject that it merits special emphasis. Since the liver is essential for certain phases of metabolism of two, and possibly all three, of the major foodstuffs it is obvious that hepatic activity must be considered in all conditions and questions in which diet is a factor. Furthermore, the importance of diet is enhanced by the fact that

intake of carbohydrate supports hepatic function, prevents hepatic injury and thus aids the organism as a whole. The proper application of this knowledge should be of value in restoring and maintaining the best physiologic state as a preoperative preparation in certain surgical conditions.

The first procedure usually performed in relation to an operation, administration of the anesthetic agent, depending on the drug used, may involve the liver. If, as is rarely the case, chloroform is used, severe and possibly fatal hepatic injury may occur. The commonly employed anesthetic agent, ether, decreases the store of glycogen in the liver because the hyperglycemia produced by ether is owing to the liver. Ether also decreases the secretion of bile as well as depresses some other functions of the liver, notably the formation of urea. If the drug employed is procaine and possibly similar agents, hepatic activity is responsible for the destruction of a major portion of the anesthetic agent.

One of the occurrences in the operating room of paramount importance to the surgeon is hemorrhage. Herein the liver has an important rôle. The normal process of coagulation depends on hepatic activity. The liver is also responsible to some extent for the restoration of fluid volume.

The liver is probably always either directly or indirectly involved in jaundice, which is often a serious complication of surgical conditions. Ascites is another condition in which the liver must always be considered, although hepatic involvement in ascites is probably not as simple as is usually thought. Finally, it should be noted that in common with a condition of insufficiency of certain ductless glands a marked decrease in hepatic function is often associated with failure of wounds to heal.

Interdependence of the Surgeon and the Investigator

I have tried to summarize the work of more than twenty years during which Dr. Judd and those of us who are engaged in experimental work jointly pursued investigations on the liver. As I have indicated, the fresh, practical, surgical viewpoint of Dr. Judd was invaluable to us and, as you have perceived, some of the conclusions reached in the laboratory have been applicable in the operating room. I hope that to those of you who are students in the medical school, the factual aspect of this review will prove to be of some service. But the inferences from present facts will change as new facts are brought forth. Perhaps the most worthwhile thought I can leave with you is that advantage accrues to the patient if those whose work lies in the operating room, and those whose lives are spent in the experimental laboratory, frequently visit one another and frequently confer.

CHANGES IN THE AORTIC CONTOUR FOLLOWING INJURIES TO THE SPINE*

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MODERN x-ray technic has clarified and simplified many problems of diagnosis by giving better definition and greater contrasts. As recently as 1918 a lateral view of the fifth lumbar vertebra was impossible because of the over-shadowing pelvis. Now it can be visualized with great accuracy. This is given as a single example of the triumph of the fine focus tube and the bucky diaphragm. On the other hand this finer detail brings into focus structures which demand interpretation. Soft tissue shadows have become distinct and must be diagnosed.

In 1929 while examining a man who had previously been injured it was noted that a shadow appeared in the x-ray film of the thoracic spine which looked like an enlargement of the descending aorta. Along with this was a compression of a lumbar vertebra which very definitely shortened the entire spine. Consultation with an in-

*From the Duluth Clinic. Read before the annual meeting of the Minnesota State Medical Association, Rochester, Minnesota, May 5, 1936.

ternist strengthened the opinion that we were dealing with an aneurysm of the descending aorta.

Later on other compression fractures revealed similar shadows in the thorax which stimulated a reconsideration of the original impression.

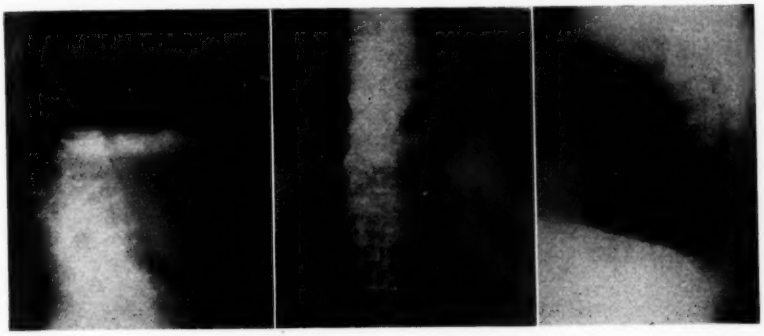

Fig. 1 *(left)*, Case 1. Lateral view of spine showing fracture of second lumbar vertebra.

Fig. 2 *(center)*, Case 2. Antero-posterior view of spine showing shadow to left of spine.

Fig. 3 *(right)*, Case 2. Lateral view of spine showing aorta behind the anterior margin of the spine.

The descending thoracic aorta normally lies anterior to the vertebral column and the right border is not seen beyond the right margin of the vertebra. The left edge on the other hand may be seen to the left of the spine, at the upper limit of the arch, gradually approaching the left border of vertebra as it descends. Köhler[3] states that any extension to the left greater than 2.5 cm. indicates diffuse dilatation or aneurysm. The distance of the left border of the aorta from the spine should decrease from above downward. The above comments apply to anteroposterior views. In the lateral projection the descending portion of the arch may be seen slightly posterior to the anterior limit of the vertebra, but as this merges into the descending aorta we find this vessel lying on the anterior surface of the spine.

As age advances, the arteries of all individuals become less elastic. The aorta shares in this characteristic. As a consequence, when the two extremities of a vessel come closer together, the intervening portion, if unable to contract, must bow outward or become kinked. The more suddenly this shortening occurs, the more marked will be this lack of straightness. From these facts it would seem reasonable to conclude that any condition which causes a shortening of the spine in an individual who has attained that age at which the aorta cannot readily contract, is likely to result in a greater portion of this vessel being seen to the left of the spine in the antero-posterior projection and behind the anterior edge of the spine in the lateral view.

The changes in the spine which may bring this about are:

1. Compression fractures, either traumatic or pathological.
2. Osteoarthritic changes with wedging of the individual vertebra, and
3. Extreme narrowing of the intervertebral discs.

Marked kyphotic changes that occur gradually over many years will, as a rule give the aorta time to accommodate itself to the new shape so that there may be no deviation to the left. A long paravertebral abscess may simulate the aortic shadow. This, as a rule however, appears on both sides of the column rather than to the left. Rare fusiform malignant growths from the side of the vertebra must be kept in mind. Usually the character of the vertebral involvement will eliminate this.

In checking over the literature very little could be found bearing directly on this subject. There are references to an elongated and tortuous aorta. Rösler of Vienna and Paul White[4] of Boston wrote an article for the August, 1931, issue of the *American Heart Journal* on "A Condition Due to Elongated and Calcified Aorta." They describe several cases in none of which was there any history of injury, but there was evidence of osteoarthritic changes in the spine. We know that the spine usually shortens in this

condition and is it not reasonable to believe that the shortened spine rather than the elongated aorta caused the tortuosity?

R. Heigl[2] describes a man whose x-ray examination showed a fracture of the twelfth thoracic vertebra with bending of a calcified descending aorta. This was found during the course of a compensation examination as was the first case. Incidentally this man had lues and he was diagnosed luetic aortitis. This is the only direct reference to our subject that I could find.

When we consider the importance of this shadow, we are led to believe that to recognize it is its chief meaning. We must be sure that it is not an aneurysm or an abscess or a neoplasm. As far as we can determine, it gives rise to no symptoms. It, *per se*, requires no treatment.

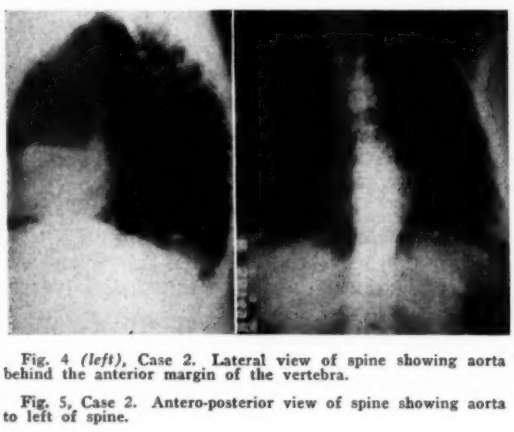

Fig. 4 *(left)*, Case 2. Lateral view of spine showing aorta behind the anterior margin of the vertebra.

Fig. 5, Case 2. Antero-posterior view of spine showing aorta to left of spine.

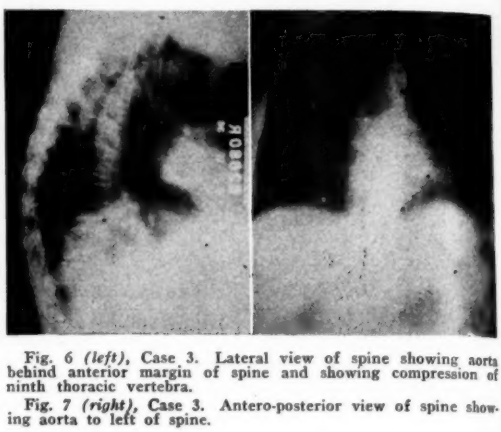

Fig. 6 *(left)*, Case 3. Lateral view of spine showing aorta behind anterior margin of spine and showing compression of ninth thoracic vertebra.

Fig. 7 *(right)*, Case 3. Antero-posterior view of spine showing aorta to left of spine.

Case 1.—C. E., a laborer, aged fifty-nine, was first examined on March 20, 1929. He complained of pain in the back and hips and inability to bend forward. On May 4, 1928, he had fallen from a dock eight or ten feet high. He was unconscious for a short time and was then taken home and put in bed. There he remained two weeks. Subsequently he was given diathermy, but was unable to return to work because of pain in the back.

As to family history, the father had died at the age of fifty-two, cause unknown. The mother had died at the age of sixty-three, cause unknown. Two brothers had died of tuberculosis, one at twenty-one and the other at twenty-three. One brother had died of smallpox at the age of seven and another brother had died of heart disease at sixty-seven. Two sisters are living and well. The patient is married and has five children.

Examination shows a well developed and well nourished man past middle life. Eyes react to light and accommodation. Throat in good condition except for a moderate amount of pyorrhea. Chest and abdomen normal. No abnormal reflexes. Examination of the spine shows prominence of the upper lumbar region with some increase in the thoracic kyphosis. Motions are restricted in all directions. X-ray reveals a compression of the first lumbar vertebra. The aorta can be visualized in the lateral projection extending posteriorly to the anterior margin of the vertebra. In the anteroposterior view there is a bulging shadow to the left of the spine seen through the heart shadow. Fluoroscopic examination showed this shadow to pulsate. An internist was consulted, who felt that this was an aneurysm of the aorta. A blood Wassermann was negative.

The diagnosis arrived at then was compression fracture of the first lumbar vertebra and aneurysm of the aorta. This diagnosis, we now feel, should be changed to kinking of the aorta with no dilatation.

Case 2.—Mrs. J. B. C., aged sixty-five, married, has four children living and well.

Her father died at ninety-eight and mother at eighty-nine. One brother living and well; one sister died of a cause unknown.

Her complaint when first examined June 3, 1935, was pain in back and difficulty in walking.

At Christmas time (1934) she had fallen on the stairs and was unable to get around for several weeks.

Present Examination: General findings negative—Examination was negative except that there was a prominence of the spine in the midthoracic region. Movements were restricted and painful. The knee jerks were exaggerated on both sides.

X-ray shows a compression fracture of the eleventh thoracic vertebra. The aortic shadow was similar to Case 1.

Case 3.—Mr. C. W., aged seventy-four, a widower, had three children living and well. He had been a teamster but was retired.

He came for examination February 7, 1934. He had fallen on the street five days previously and had had much difficulty in arising and much pain in the back which had persisted. The main interest in the examination in this instance was the x-ray findings of compression fracture of the twelfth thoracic vertebra. Here again we find an aortic shadow that is abnormal. We find it more prominent to the left in the anteroposterior view and further back in the lateral view. A subsequent check up two years after the accident revealed compression of two more vertebra at a higher level. (Wassermann negative.)

Case 4.—Mr. P. B., aged seventy-five, married, seven children. The patient was in an auto accident two months before the examination which was made in December, 1927. The interest centers chiefly in the x-ray findings which revealed osteoarthritis and a compression of the eighth thoracic vertebra. Aside from this the aorta is plainly visible extending behind its normal position in the lateral view and to the left in the anteroposterior view.

Summary

1. A shortening of the spine, such as that resulting from a compression fracture of a vertebra, may cause a displacement of the shadow of the aorta which with the newer x-ray technic may be seen to the left and posterior to its usual location.

2. Little corroboration of this finding has been found in the literature.

3. Its main importance lies in the avoidance of a faulty diagnosis of aneurysm, mediastinal abscess or tumor.

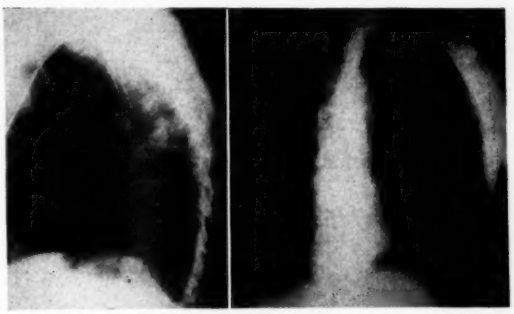

Fig. 8 *(left)*, Case 4. Lateral view of spine showing aorta behind anterior margin of spine.

Fig. 9 *(right)*, Case 2. Antero-posterior view of spine showing aorta to left of spine.

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CONGENITAL CARDIAC DEFECTS*

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IN recent years, the subject of congenital cardiac defects has passed from being a matter of merely academic interest, to one of great scientific importance in the diagnosis and treatment of cardiovascular disease. This fact is borne out by the prominence that is given to this phase of cardiac disease in the recent monthly bulletins of the American Heart Association. These articles have been written by Dr. Maude Abbott,[1] who has given this subject much careful study, and has written monographs and many articles as a result of these observations. It is hoped that this brief article will serve to arouse a more general interest in the profession toward this important branch of cardiology.

Incidence.—Congenital heart defects are either on the increase, or they are more frequently diagnosed. Phillpot found in 7,200 autopsies following death from all causes, an incidence of 1.1 per cent of congenital cardiac anomalies. Others have found a similar ratio. The largest ratio was found in the earlier months of life. This, however, does not lessen its importance to the internist, who is to be on the alert and able to arrive at a differential diagnosis of any cardiac lesion. Many of these individuals live to the full three score and ten years span of life, and

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must be treated as intelligently as any other type of heart disease.

Classification.—The clinical classification has been based upon the pathologic physiology of the circulation as altered by the defect present, and the special symptoms thereby induced. This classification made by Abbott and Dawson has been fully recognized by cardiologists as the most acceptable up to the present time. They place them in three groups as follows:

I. *Acyanotic Group.* Cases in which there is no abnormal communication between the two circulations, so that no cause for cyanosis exists, but the anomaly is the seat of strain.

II. *Cyanose Tardive.* Cases in which there is absence of cyanosis, except as a transient or terminal feature. These are the localized cardiovascular septal defects, patent ductus and foramen ovale, in which there occurs an arterial-venous shunt from left to right through the defect, with possible terminal reversal of flow.

III. *Cyanotic Group.* Cases presenting constant, progressively increasing cyanosis, due to a permanent venous-arterial shunt, or prolonged deoxygenation in the capillaries, the result of grave structural changes, and giving rise to the familiar symptom-complex of persistently raised oxygen-unsaturation.

The Most Common Defects.—The congenital defects are listed below in the order of frequency as reported by Christian,[3] Abbott[1] and others:

1. Patent foramen ovale.
2. Defects of interventricular septum (maladie-de-Roger).
3. Patent ductus arteriosus (Botalli).
4. Coarctation of the aorta.
5. Pulmonary stenosis.
6. Anomalies of semilunar cusps.
7. Complete transposition of arterial trunks, with or without interventricular septal defects.
8. Complete defects of cardiac septa.

To these may be added the following anomalies:

1. Dextrocardia.
2. Congenital enlarged heart.
3. Congenital small heart. The extreme "drop type." We have added the small heart to this list, as our experience has shown that the extreme "drop type" of heart constitutes a handicap almost as serious as some of the other forms of cardiac defects.

Several combinations of these anomalies often occur, such as those that comprise the tetralogy of Fallot, namely, pulmonary stenosis, defective interventricular septum, dextroposition of the aorta, and enlargement of the right heart.

Etiology.—No definite etiological factors have been determined. In the cyanose tardive (Group II) cases, the arrest of development has occurred before the end of the eighth week of fetal life, while arrest of development in the acyanotic (Group I) cases occurs after that time. Myocardial and endocardial disease in early fetal life are considered possible. Toxins due to alcoholism, syphilis, and maternal infection are important factors. Weakness of the germ plasm due to consanguinity and obscure hereditary factors must be considered important in the etiology. Neglected and improper prenatal care of the mother undoubtedly must be considered one of the chief causes of these cardiac defects.

Symptomatology and Diagnosis.—In this brief paper, we can only call attention to some cardinal or salient points. The individual is of the "gracile" type, with a tendency to effort syndrome. The cardiac signs are found in early childhood, and cannot be traced to a definite illness of the type that causes cardiac disease. The loud murmurs at the base of the heart are far out of proportion to the signs of cardiac failure. Persistent cyanosis from infancy, with clubbing of fingers and poor physical development, definitely places the case in Group III. Undue cyanosis in times of stress of the pulmonary circulation, such as in pneumonia, gives a valuable hint as to the strong possibility of its being a case of defect of the "cyanose tardive" group. The reader is directed to the extensive literature on this subject, for further elaboration on the various types of murmurs and their significance.

The x-ray and the electrocardiogram are valuable adjuncts in the diagnosis of these defects. In coarctation of the aorta, there is the enlarged aorta with erosion of the ribs. Higher blood pressure in the upper than in the lower extremi-

ties completes the picture. The large pulmonary conus in patent ductus, and the enlarged right heart in the tetralogy of Fallot, and other septal defects with pulmonary stenosis, are among the recognized x-ray findings. The electrocardiograms usually show a wide range of the Q R S complexes in two or three leads. There is a marked right ventricular preponderance, and a high P wave in Group III, and often in Group II. In Group I, there is usually a left ventricular preponderance, and frequently, there is an inversion of the T wave in one of the leads.

Complications.—Briefly speaking, these hearts are subject to the same diseases as the normal hearts, but they are more susceptible to intracardiac infection, such as those produced by the streptococcus hemolyticus and viridans. Valvular infections with extensive vegetations and subacuate bacterial endocarditis very frequently are the cause of death.

Treatment.—Early diagnosis is essential in order that unnecessary digitalization and other cardiac stimulation may be avoided. These measures are useless until conditions arise that usually cause cardiac failure, and then the treatment should be the same as that employed for any impending cardiac decompensation, for the areas of the defects are prone to become involved by any infection that may tend to involve the heart. These patients should be reassured and their affliction should not be stressed, in an effort to avoid the invalidism and mental depression to which they are prone. They must, of course, follow a carefully regulated life and be protected as far as possible from infections. Lighter forms of occupations, mostly of the sedentary type, should be planned for these young people. Such debilitating conditions as obesity and mental stress should be avoided as far as possible. Physical exercise should be regular, but moderate. Those of the acyanotic group should be encouraged to believe that a normal span of life awaits them.

Prevention of these defects may be possible by paying more attention to prenatal care, and avoidance of infections in the mother during pregnancy.

Conclusions

1. Congenital defects of the heart are not so rare that special interest in them should be lost by the general practitioner.
2. A more thorough understanding of the clinico-pathologic aspects of this special branch of cardiology is to be encouraged.
3. Early diagnosis is essential to the proper management of those afflicted with cardiac defects.

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COARCTATION OF THE AORTA*

Report of Two Cases

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Duluth

CASE reports of coarctation of the aorta with pathological findings have been appearing with considerable frequency in recent years. I doubt, however, whether the average doctor has any clear mental picture of the clinical findings in an infant or child in whom this condition is to be suspected. The purpose of this communication, therefore, is not to review the literature but to concentrate on the clinical features of two cases which illustrate unusually well the two types of this condition. I shall, however, report the pertinent pathologic findings in detail. For the drawings carefully made from the actual specimens, I am indebted to Dr. L. L. Merriman of Duluth.

Case 1. This is the case of a bright, active lad, eight years of age, who dramatically dropped dead while his mother was dismissing him for school.

K. S., a boy then five and a half years of age, was

*Read before the St. Luke's Hospital Staff, Duluth, Minnesota.

first brought to my office in July, 1930, for suspected "heart trouble." The mother stated that her suspicions were aroused because she had noted the loud pounding of his heart when he slept with her at night. She stated, however, that he was extremely active and had seldom been ill. He had previously had tonsillitis twice, mumps and influenza.

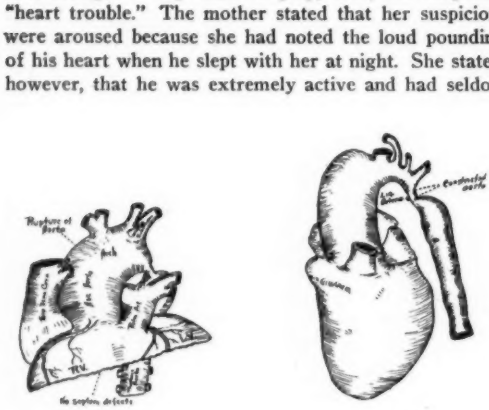

Fig. 1 *(left)*. Coarctation of the aorta (adult type). The stricture is just distal to the ductus arteriosus which is closed. Both ventricles are hypertrophied. The ascending aorta and arch are very greatly dilated. The thoracic aorta is normal in size. The pulmonary artery is not enlarged. The mitral valves are normal. There are no septum defects. The branches of the thoracic aorta are definitely enlarged, as are also the internal mammary arteries. An aberrant artery arises between the left carotid and left subclavian.

Fig. 2 *(right)*. Same specimen as shown in Figure 1. Drawing made from mounted specimen. The ligamentum arteriosum is severed and the aorta stretched out to show relationship of the stricture to other structures.

Physical examination showed a well developed boy of good nutrition and rather high color. He was bright, rather precocious in fact, and of nervous type.

The tonsils were small and apparently normal. There were no enlarged glands. The teeth were normal. The nose was normal although the history pointed to some allergic rhinitis at times. The lungs were quite clear and there was nothing in his examination of interest except that which related to the heart. This organ was definitely enlarged and the apex beat was displaced decidedly to the left. There was a marked visible impulse. At the apex a short systolic bruit, not well transmitted to the axilla, could be heard. This bruit became more pronounced toward the base and was very loud over the pulmonary and aortic areas. There was no exophthalmos and no enlarged thyroid. A systolic blood pressure of 160 was noted. It was felt that a congenital condition was likely present but that only time and observation could rule out an acquired lesion.

When seen again a few weeks later the same plain systolic murmur was heard, loud and vibratory over the base. Such a bruit would suggest the persistence of a Ductus Botalli as one of its elements. The systolic pressure was 130 at this visit; the pulse 96.

After several months he was seen again (October, 1932). The mother stated a few things not mentioned before, namely that he did complain somewhat of pains in his legs at night time and that he was inclined to be irritable and rather easily fatigued. There was no apparent change in the heart outline. The blood pressure was: systolic 116, diastolic 76. The bruit seemed softer and less intense.

The continuance of a constantly normal rectal temperature and the absence of any real disturbance due to exertion, made it practically certain that we were dealing with a congenital lesion. An x-ray picture taken about this time was somewhat disturbing, however. It showed a moderate increase in the total width of the heart with enlargement especially of the left auricle and left ventricle. It suggested a mitral type of lesion.

During the whole following year (1933) there was little change in his condition. His weight increased the normal amount and he was, if anything, more than normally active. At one period in this year he developed a cough which was suspected but not proven whooping cough. This passed with no apparent bad effects.

In 1934, I saw him only once. He was then seven years old and weighed 60.5 pounds. His height was 51.25 inches. His pulse at rest was 84, after exercise 90. His hemoglobin 85 per cent, red count 5,850,000, blood pressure 140/100. The bruit had changed very little if any. It seemed somewhat more rumbling in type. Both second sounds were markedly exaggerated.

On February 24, 1935, this boy played unusually hard and among other things, climbed to the top of a lofty ski-scaffolding. He slept restlessly that night but the following morning was up as usual and ate his breakfast. As he was about to leave for school and while his mother was assisting him with his clothes and books, he suddenly dropped to the floor, dead.

The autopsy disclosed a rupture of the ascending arch of the aorta. This, with the resultant hemopericardium, was the direct cause of death.

The autopsy, done by Dr. George Berdez, was complete in every detail, save that the examination of the brain was not permitted. I cite only the pertinent findings.

"The cavity of the pericardium contains 500 c.c. of partly clotted blood. The heart weighs 240 gms. The ascending aorta is very much dilated and measures up to 11 cm. in circumference. At 3.5 cm. above the aortic valves, the lateral and posterior aspect of the ascending arch shows an oblique tear with somewhat ragged edges measuring up to 1.1 cm. in length, which sets a wide communication between the lumen of the aorta and the pericardial cavity. The aortic valves are slightly fused by their lateral margins. They are somewhat irregularly thickened. The intima of the arch of the aorta is irregularly thickened and shows pale, cloudy, yellowish deposits in places. The circumference of the aortic rings measures 7 cm. in length. The wall of the arch of the aorta is irregularly thickened mainly in the concavity of the arch, while the convexity shows thinner areas. The ductus arteriosus is closed and just below the point where the ligamentum arteriosum is attached to the aorta, there is a marked diaphragm-like stricture of the aorta. The internal circumference of the stricture measures 0.6 cm. in length. The 2 cm. of the aorta above the stricture are narrower than the rest of the arch. The branches of the aortic arch show the usual disposition. In addition, a smaller

artery leaves the arch between the openings of the left carotid and the left subclavian artery. The aorta below the stricture shows almost immediately a normal width again. The openings of the intercostal arteries below the stricture seem to be slightly wider than usual at this age. The lower edges of the ribs show no unusual groove formation.

"The foramen ovale is closed. There are no septum defects between the ventricles. The walls of both ventricles are hypertrophic. The wall of the left ventricle measures up to 1.7 cm. in thickness. The wall of the right ventricle measures up to 0.5 cm. in thickness. The pulmonary valves are also slightly thickened. The mitral and tricuspid valves show nothing of note. The myocardium is pale. The heart is contracted. The cavities of the heart contained only a little partly clotted blood.

"The left lung weighs 240 gms. The right weighs 300 gms. Both are somewhat congested but air containing throughout. Edema grade I of posterior parts."

Anatomic Diagnoses: (a) Coarctation of the aorta (adult type) and stenosis below (beyond) the point of attachment of the arterial ligament; (b) dilatation of the arch of the aorta; (c) hemopericardium (500 c.c.); (d) congestion of lungs.

Case 2.—This is a case of coarctation wherein the major clinical feature was the inability of the subject to establish normal growth and weight; that is to say, the condition was one of cardiac infantilism.

Lorraine T. was born January 31, 1935. She was the fifth child. Of the other four children, one had died immediately after birth, one was stillborn, while the third and fourth were normal.

The birth weight was 3,220 gms. (7 pounds 2 ounces). The infant, therefore, was of good nutrition at birth, indicating that intrauterine conditions were favorable for the fetus. After birth, however, less satisfactory conditions prevailed. For three days nothing abnormal was noted. Then there occurred some slight twitchings followed by temporary spastic contractions of the arms and legs. During this attack there was slight cyanosis. But the attack was not repeated on the succeeding days, and when the baby left the hospital on the eighth day, it weighed 3,035 gms. The baby was getting very little from the breast and it was necessary to complement the feeding.

The mother soon reported that the baby was vomiting and refused its bottle or the major portion of it. This was a true dysphagia although we did not recognize it as such at first.

At two months of age the baby weighed less than at birth and it was taken to St. Mary's Hospital for study. The following conditions were noted: marked pallor, protruding sternum, loud pounding cardiac systole, difficulty in swallowing. Already the infantile stamp was on the baby, that is, there was a symmetrical smallness of all the features and limbs. There was no evidence of rickets. The heart sounds were clear but markedly exaggerated. A decided enlargement of the heart was noted but there was no definite bruit. Shortly after this, however, a definite thrill was recorded and a diastolic bruit over the pulmonary area was noted. This suggested a patent foramen ovale.

The dysphagia continued and was uninfluenced by the type of food. A peculiar cough, resembling an aneurysmal cough, also appeared.

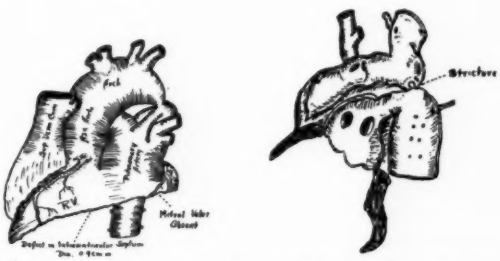

Fig. 3 *(left)*. Coarctation of aorta (infantile type). The stricture of the aorta is proximal to the ductus arteriosus, which is widely patent. The right ventricle is markedly dilated and very hypertrophic. The left ventricle is small. The ascending aorta and arch are moderately dilated. The thoracic aorta is about normal in size. The pulmonary artery is very greatly dilated. The mitral valve is absent. An interventricular septum defect is present and also a patent for ovale.

Fig. 4 *(right)*. Same specimen as shown in Figure 3. Drawing made with aorta, pulmonary artery and ductus arteriosus opened up.

The large size of the heart and the comparative absence of bruits seemed hard to explain. A pulmonary stenosis combined with a patent ductus and a patent foramen ovale might explain the enlargement but the exaggerated clearness of the sounds and the almost complete absence of bruits were hardly compatible with this conception. The possibility of an ante natal pericarditis was discussed, as was also the possibility of a so-called congenital hypertrophy of the heart.

An x-ray taken on April 11, 1935, showed no evidence of fluid but a generalized cardiac enlargement. The base of the heart was enlarged both to the right and the left. There was no evidence of disease in the lungs or the esophagus.

The blood findings were: hemoglobin 78 per cent, red count 3,900,000, white count 7,300. The polymorphonuclear cells numbered 61 per cent and the lymphocytes 34 per cent.

In August, 1935, at the age of seven months, the weight was only 8 pounds 6 ounces. There was now evident a decided systolic murmur, heard best over the mid-cardiac region. The afore-mentioned diastolic bruit could also be heard. The second sounds seemed even more exaggerated.

Various formulas and methods of feeding were tried but it was impossible to cause any consistent gain. Always anorexia and dysphagia would ensue. Tube feeding was also unsuccessful. In October, at the age of nine months, the weight was nine pounds. The baby now presented the typical picture of infantilism. She was comely and intelligent but there was symmetrical smallness of all the features and members.

The greatest weight attained was 10 pounds. The baby died at eleven months of age.

Again I give just the pertinent findings at autopsy.

The autopsy, done by Dr. George Berdez, was complete in every detail.

"The heart is at least twice the normal size. The left atrium contains some fluid blood. *There is complete absence of the mitral valves.* The left atrium communicates with the right atrium through an opening measuring .3 cm. in diameter (foramen ovale). The left ventricle is small and communicates with the right ventricle by a round opening .9 cm. in diameter (interventricular septum defect).

"The right atrium is dilated and the right ventricle markedly dilated and hypertrophied. The pulmonary artery below the bifurcation is very dilated. The ductus arteriosus is patent and is the size of a small pencil. The aortic valves are thicker than normal. The ascending aorta and arch as far as the left subclavian are dilated. From the left subclavian to the ductus the arch is very much narrowed. It is not closed but a small opening (.2 cm.), proximal to the ductus, persists. The effect is that of a diaphragm with a small central aperture. The endocardium of the left atrium is markedly thickened.

"The esophagus shows nothing abnormal and there are no other abnormal findings."

Anatomic Diagnoses: (a) Coarctation of the aorta (infantile type); (b) absence of mitral valve; (c) persistency of foramen ovale and of ductus arteriosus; (d) interventricular septal defect; (e) hypertrophy and dilatation of right ventricle; (f) congestion of lungs and spleen; (g) emaciation grade III.

Discussion

Represented here are the two types of coarctation of the aorta. The first case is an example of the adult type. The second case is an example of the infantile type.

In the adult type the obstruction lies beyond the ductus. There are usually no other major abnormalities. Life may be indefinitely prolonged. Death may ensue from mesaortitis, plaques, abscess in the wall of the aorta with dissection. Rupture into the pericardium may occur. Cerebral hemorrhage may also be a cause of death.

Certain striking clinical signs may be demonstrable in the adult type. High blood pressure, higher in the upper than in the lower limbs, is one feature. Rib erosion, resulting from enlarged intercostal arteries, may be prominent. The florid complexion, the striking collateral circulation, the heart findings clarified by x-ray should help in making the diagnosis, if one is thinking of the condition. Oblique fluoroscopy or film may bring out the lack of aortic knob or perhaps a break in the continuity of the arch.

To be looked for also are abnormal pulsation in the neck with absence of pulsation in the abdominal aorta, femoral or popliteal arteries. This very pulsation in the neck, with the flushing and hypertension, has lead to erroneous diagnosis of hyperthyroidism. The presence of abnormal collateral circulation involving the intercostal and mammary arteries should always cause suspicion. Marked pulsation and even hemorrhage may show in the fundi.

In the infantile type we have antomical conditions which are incompatible with prolonged life. Here the right ventricle supplies blood (per ductus) to the descending aorta. In fetal life conditions are satisfactory. However, after birth, when the pulmonary circulation assumes primary importance, there is insufficient supply to the vital abdominal organs. In this type, as Ballantyne has well pointed out, there is not the incentive to form an adequate collateral circulation as in the adult type. When the obstruction is beyond the ductus (adult type) it is imperative to build up adequate collaterals even in fetal life. Failure to do this would be incompatible with growth and development. But in the infantile type circulation is sufficient until after birth. Then, as the blood which was reaching the abdominal aorta by way of the pulmonary artery and ductus arteriosus is now diverted to the lung, it is evident that the abdominal organs will be correspondingly robbed of nutriment.

Other factors also play a part. There is always suboxidation when there is a single ventricle (as in this case). Many congenital anomalies occur in this infantile type and auscultation may be extremely confusing. A patent ductus will show a rough systolic bruit near the pulmonary area with the pulmonic second sound accentuated and the presence of a decided thrill. Both bruit and thrill developed slowly here, probably waiting an hypertrophy of the ventricles. All in all, the whole clinical picture has to be grasped.

The incidence at autopsy of both types is 1 to 1000.

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RHEUMATIC HEART DISEASE*

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RHEUMATIC fever has frequently been considered an acute disease, but although its symptoms may appear suddenly and may occur as acute exacerbations, it exemplifies one of the most chronic infectious diseases known.

The typical features of rheumatic fever, such as increasing fever, toxemia, sweats, migratory involvement of large joints, and leukocytosis, are so well known that further emphasis would be unnecessary. At the end of three or four weeks, in many cases, the patient is apparently well and is able to return to work. The disease often appears to be self-limited. In many cases, the convalescence is not uneventful and, after a brief and variable period of normal temperatures and absence of leukocytosis, these signs reappear, and the pulse rate increases and is often disproportionate to the degree of fever. A systolic murmur may be audible over the cardiac area, and there may or may not be disturbances in the rhythm of the heart. These phenomena must at once direct attention to cardiac involvement. It is well to carry suspicion even further, because of the appallingly high incidence of carditis in rheumatic fever, and to consider the heart as participating in the disease until positive proof to the contrary is available.

It is not unusual, in practice, to observe patients with well marked mitral stenosis who deny ever having been afflicted with rheumatic fever or chorea. Since these lesions are so notoriously the result of rheumatic fever, the question is at once brought to mind whether or not such patients have suffered from rheumatic fever in one of its more unusual forms. Frequently, the patient dates his illness from an acute infection, which is said to have been influenza; yet it is known that bona fide cases of influenza have been exceedingly rare since the pandemics. Furthermore, it is known that cardiac injury, at least of the type simulating rheumatic carditis, did not occur with influenza. These observations may indicate that current, unidentified, infectious illnesses are in reality nonarticular forms of rheumatic fever. Sutton stated that of 427 boys and girls who had rheumatic cardiac disease, 18 per cent did not give a history of chorea, acute arthritis, or growing pains.

The primary attack of rheumatic fever may be followed immediately by a second attack, in all respects similar to the first, with recurrent, migratory articular involvement and with evident visceral participation. In cases of lesser recurrences, particularly, the therapeutic measures employed may modify the clinical picture sufficiently to mislead medical judgment. Control of symptoms and signs by treatment may erroneously be interpreted as being the result of spontaneous abatement of the disease, and premature activity on the patient's part may result disastrously. But before stressing the cardiac phases of rheumatic fever it may be well to consider the invasion of other parts of the body by the disease.

Fibrinous pleuritis not infrequently occurs in rheumatic fever, especially as a complication of rheumatic carditis. It occurs most commonly on the left side, probably because of the proximity of the pleura to the pericardium, although cases of bilateral pleuritis have been reported. The inflammatory process may be fibrinous or serous, and if effusion occurs it is in moderate amount only and aspiration rarely is required. The acute process subsides by organization of the fibrinous exudate and resulting obliteration of adhesions between the visceral and parietal layers of the pleura.

Rheumatic fever is sometimes accompanied by bronchopneumonia, or by lobar pneumonia, which may occur at any stage of the disease. I have seen bronchopneumonia occur almost coincidently with exacerbation of rheumatic fever. Rabinowitz described what he believed to be a pulmonary lesion characteristic of rheumatic fever. The lungs do not show pneumonic consolidation, but areas of congestion, edema, and atelectasis are present. Vascular lesions also exist.

Acute nephritis during the course of rheumatic fever is rare, although instances have been reported. Abnormal constituents of the urine dur-

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ing the acute infection, such as erythrocytes and casts, strongly suggest actual renal injury, and it is possible that the low incidence of nephritis signifies that virtually complete recovery of the kidney occurs in the majority of cases. Intimal lesions in the arterioles of the kidney identical to those observed in the pericardium were observed by Evans in a case of rheumatic fever; others have recorded similar observations.

The participation of the skin in the disease apparently often escapes detection. Small subcutaneous nodules may occur. They vary in size from 0.5 mm. to 0.5 cm., they are firm and usually painless, and they are most likely to be situated just under the skin, overlying such prominences as the patellas, elbows, dorsal surfaces of the hands and feet, skull, and vertebræ. The nodules are evanescent; they appear suddenly, remain a few days, and then disappear, although they may persist for several weeks or months.

The identification and description of rheumatic lesions in the blood vessels, especially by Klotz and by Pappenheimer and VonGlahn, have been valuable contributions to the subject and have, above all, emphasized the widespread distribution of the disease in the body. The lesions demonstrated by these workers were microscopic in nature and consisted of Aschoff's bodies or isolated Aschoff's cells in the adventitia of arteries. They found healed lesions, appearing as flame-shaped scars, in the media, and in later studies they found active lesions in the media of nutrient arteries. The walls of these arteries were thickened from swelling and proliferation of the endothelium and from cellular infiltration. Large collections of lymphocytes, polymorphonuclear leukocytes, and Aschoff's cells surrounded the vessels. The arteries that have been found to share in the disease are the aorta, the coronary arteries and their branches, and the arteries of the lungs; also involved are the aortic valve, kidneys, perirenal and perisuprarenal adipose tissue, testes, ovaries, pancreas, and intestines. Thrombosis of larger veins is observed occasionally. Aschoff's nodules also have been demonstrated in the diaphragm.

I have commented on the wide distribution of the disease to emphasize one of the prominent modern conceptions regarding it, for without this point of view the disease will continue to be overlooked in its nonarticular form.

As has been stated, the heart is involved in a remarkably high percentage of cases of rheumatic fever. The incidence is so great that old, healed, rheumatic defects of the valves are one of the leading causes of cardiac death. Invariably, the endocardium, myocardium, and pericardium are involved, but not always in the same proportion. Tissues that through anatomic arrangement and physiologic demand are dynamic and bear stress have been shown to be favorite sites for the localization of lesions. This is particularly true of the heart and its structurally complex components. The endocardium apparently reacts to the rheumatic process in a manner similar to that of the endothelium of arteries.

In fetal life the cardiac valves contain vascular structures which apparently, in many cases, disappear with the advent of childhood. The persistence of these vascular structures in childhood and adolescence has been demonstrated by Kugel and Gross, Bayne-Jones, and Kerr and Mettier. It is believed that the persistence of vascular structures increases the likelihood of valvulitis. The subendocardium, below the juncture of the valves with the endocardium and the endothelium of the vessels, is also a region that is involved in the rheumatic process. Thus there are several possible ways in which valvular injury may occur: (1) by involvement of the investing endocardium, (2) by injury in and about the vessels of the valves, and (3) by lesions in the valvular rings.

The older conceptions regarding valvular injury were different from those held at the present time. It was believed that infection occurred primarily on the surface of the valve and extended by continuity into the deeper structures. Modern studies, however, have clearly disproved this view and have established the process as one of primary valvulitis.

The vegetations of rheumatic endocarditis are small and verrucous and occur at the line of valvular closure. In the mitral valve the entire line of closure is the seat of verrucæ; in the aortic and tricuspid valves, only a portion of the line of closure is involved. The vegetations heal at a very early stage, and in time become firmly organized. The great tendency for rheumatic endocarditis to produce stenosis is not adequately explained by cicatrization of the verrucæ, but the occurrence of interstitial valvulitis readily tenders an explanation. Shortening of the chordæ

tendinæ by inflammation and by stress also contributes to the stenotic process.

A single attack of rheumatic fever may result in mitral stenosis, but the ultimate valvular deformity may not entirely result from the initial, acute infectious process. A low-grade and extremely chronic infection may persist for a considerable time, and lesser recurrent episodes occur that actually cause greater subsequent injury than that which results from the primary infection. This point becomes of great practical importance in the treatment of patients with rheumatic carditis. Pure valvular insufficiency is rare; yet occasionally such defects are disclosed at necropsy.

Many observers have demonstrated typical rheumatic lesions in the endocardium of the left auricle, and occasionally in the right auricle. The lesions extend upward from the root of the posterior leaflet of the mitral valve and resemble patches of endothelial thickening. Sometimes they are covered by a thin layer of fibrous tissue. The lesions are small, rarely extend 3 cm. in diameter, and ultimately become flattened areas of increased density. They contain Aschoff's bodies which occur in rows by virtue of the arrangement of the lamellæ of the elastic tissue; the result is a banded appearance.

The myocardium always participates in the disease. The characteristic lesions are Aschoff's bodies, which are rounded, fusiform, or spindle-shaped bodies in the interstitial substance, usually in the immediate vicinity of an arteriole. They are usually invisible to the naked eye. They occur in greater numbers in the left ventricle, particularly near the origin of the aorta, in the muscle in the vicinity of the mitral valve, in the apex near the septum, and in the intraventricular septum near the base.

Aschoff's nodules are composed of large cells surrounding a necrotic center; the cells are polygonal and contain one or more nuclei. Their presence is irrevocable proof of rheumatic fever, but their absence does not imply the converse because of the fact that they ultimately disappear. They are believed to exist for several weeks to several months, and ultimately they are replaced by scar tissue.

It is not definitely known at which stage of rheumatic infection hypertrophy of the myocardium occurs, although Coombs ventured the opinion that it begins while the signs of acute carditis are subsiding. Dilatation and hypertrophy, to some extent at least, are direct results of myocardial involvement; they have been proved to occur in the absence of a valvular defect or of pericardial adhesions. With the addition of mechanical barriers, such as those imposed by stenotic lesions, hypertrophy may become very pronounced.

Some degree of fibrinous pericarditis is almost always an accompaniment of rheumatic carditis. It is usually part and parcel of pancarditis, although instances without endocardial involvement have been observed. The involvement may be patchy, but more generally it is diffuse. If exudation is profuse, it is churned by the heart's movement into transverse or oblique ridges, which gives the irregular, shaggy appearance of the so-called cor villosum. As organization of the exudate occurs, the pericardial cavity becomes obliterated, in part or entirely. In more severe infections, the inflammatory process may extend beyond the parietal pericardium and may produce adhesions to the diaphragm, pleura, mediastinum, and thoracic wall. This results in one of the most crippling mechanical barriers to which the heart may be subjected. The pericardium is also the seat of Aschoff's nodules.

The apparent predilection of rheumatic fever for the vascular structures at once brings forth the magnitude of this phase of the disease. The extensive involvement of the cardiac structures, in the majority of cases, emphasizes the seriousness of rheumatic carditis, the proof of which is found in the studies on mortality. The nature of the resulting mechanical barriers constantly subjects the heart to increased load, which is an important factor in subsequent cardiac failure. The chronicity of the infectious process and its tendency to recur are likewise provoking influences in promoting cardiac failure.

Numerous theories and hypotheses concerning the etiology of rheumatic fever have been advanced, but positive proof of a specific cause has not yet been presented. Little doubt remains that the disease is infectious, and in numerous instances strong evidence for its communicability has been presented.

Nonhemolytic streptococci have frequently been recovered from the blood, joints, cardiac valves, and pericardial fluid in rheumatic fever, and numerous investigators, particularly Poynton and Payne, Rosenow and Coombs and Clawson, asso-

ciate this organism with the etiology of the disease.

Inoculation of animals with streptococci isolated from patients with rheumatic fever has resulted in myocardial lesions that are similar to, but not identical with, Aschoff's nodules. On the identity of these experimental lesions rests, to a considerable extent, the controversy attending the hypothesis that streptococci are the cause of the disease. Subacute bacterial endocarditis has now been positively identified with the invasion of nonhemolytic green-producing streptococci, and and the occurrence of this disease in such an unusually high percentage of cases in which patients have previously been afflicted with rheumatic fever has offered an alluring causal association. An immediate objection to this idea presents itself in the great differences in the reaction of the tissues to the two diseases. The lesions of subacute bacterial endocarditis are almost without exception embolic; the lesions of rheumatic fever are unmistakably of two types, exudative and proliferative, whereas embolic phenomena are rare except as they occur with subsequent cardiac failure.

These differences between rheumatic fever and subacute bacterial endocarditis have been explained theoretically as being due to differences in the number and the virulence of the organisms. Convincing proof of this allegation, however, is still lacking. Swift discussed three aspects of the etiology of rheumatic fever: (1) elective localization of streptococci, (2) elaboration by specific organisms, of specific toxins, and (3) rheumatic fever as an allergic phenomenon. He met the argument for elective localization with the objection that the disease is not limited but is as widespread as syphilis. The hypothesis of specificity of streptococci, as advanced by Small, is dependent on recovery of indifferent streptococci in blood cultures from some patients with rheumatic fever, on modification of the course of the disease by an immune serum prepared against these organisms, and on the effect of a vaccine prepared from them. Swift objected to these claims with the statement that they do not take into consideration the possible part played by other types of streptococci which have been recovered from blood cultures or tissues of patients, and that they do not consider the influence of other types of antistreptococcus serums or vaccines.

The studies of Hitchcock and of Nye and Seegal have shown that indifferent streptococci are found as frequently in the throats of nonrheumatic as in those of rheumatic subjects, and that the strains recovered from blood cultures belong to different immunologic groups. Swift and Kinsella, and Zinsser and Yu, have shown a multiplicity of cultural and immunologic types of streptococci, and Menzer, Cole, and Bull have demonstrated that strains recovered from patients with rheumatic fever produce the same lesions as do those strains obtained from the throats of nonrheumatic persons when such strains are injected in large numbers into experimental animals.

In recent years, investigators have been considering allergy as at least a factor in the etiologic problems of rheumatic fever. Swift looks on the allergic hypothesis as a reasonable explanation which may account for the disagreement regarding the infecting organism. The investigations of Swift and his coworkers, regarding allergy are of interest, and merit careful consideration. They found that, in rabbits, the production of focal lesions by certain nonhemolytic streptococci resulted in a hypersensitive state similar to that which occurs in tuberculosis. They expressed the belief that this hypersensitive, or allergic, state is dependent on the production of focal lesions, and that when the state is once present it can be continued by injection of streptococci that practically do not provoke a reaction in normal animals. An animal that has been highly sensitized responds to intracutaneous injection of very small doses of streptococci, with marked edema, exudation, and proliferation, and to corneal injection it responds with interstitial keratitis; when sufficiently large doses are administered intravenously, it dies.

None of the animals that were first inoculated intravenously, showed the reactions of hypersensitiveness, and the resulting lesions were considerably smaller than those which occurred in normal animals following intracutaneous inoculation. In the majority of their animals, Swift and his co-workers could maintain the hypersensitive state by intracutaneous inoculations which were continued for months; however, intravenous inoculation with appropriate doses abolished the reaction, so that the animal was in the nonsensitive, or immune, state. The prolongation of the hypersensitive state by focal lesions appeared

to be distinctive of the nonhemolytic streptococci, for repeated intracutaneous inoculations of hemolytic streptococci brought on decreasingly intense reactions. There was no apparent specificity of nonhemolytic streptococci in hypersensitive animals.

These observations which seem to demonstrate an allergic and an immune type of reaction toward the same nonhemolytic streptococcus are of significance, and Swift applied these phenomena to the well known differences existing between rheumatic fever and subacute bacterial endocarditis. In rheumatic fever, focal infection is frequently conceded to exist, and there is a marked tissue reaction to certain irritants, which, if they are streptococci, are present in only small amounts in any one region.

As has been stated, the tissues in subacute bacterial endocarditis fail to respond overactively to the infective organism. The lesions in this disease are embolic and the tissues involved do not react by exudation or by proliferation to the extent observed in rheumatic fever. Swift did not interpret the data in subacute bacterial endocarditis as indicative of failure of the tissues to react to the infection, but rather to a reaction characterized by diffuse hyperplasia of the hematopoietic system, and to the embolic lesions.

In defense of the allergic theory of rheumatic fever he stated that, although the part played by streptococci in causation is not irrevocably established, it offers the best available explanation of how different strains of the organism could produce analogous clinical and histopathologic effects.

Rheumatic carditis has frequently been observed following chorea, and this established chorea as being closely related to rheumatic fever.

The lesions of rheumatic fever are exudative and proliferative. There is a reaction of the tissues to areas of focal necrosis which in many instances is extremely minute. Following this destruction of tissue, exudation of fluid and of cells occurs; it is exemplified very well in periarticular accumulations. The fluid contains fibrin, many polymorphonuclear neutrophils, and, often, wandering cells. Similar exudates are found in lesions of the endocardium of the left auricle, the aorta, and smaller arteries.

Frequently, marked increase in the fixed tissue cells occurs and forms the basis of Aschoff's nodules and the subcutaneous nodules; the latter appear to take their origin from the perivascular spaces. This proliferative tissue reaction has been found not only in the heart, but also in the lungs, pleura, and elsewhere. Exudative lesions, of course, are not characteristic of rheumatic fever, but the degree of exudation surpasses that of most other diseases.

It is interesting, after appreciating certain clinical features of rheumatic fever and its pathogenesis, to compare it with tuberculosis. While the etiology of the two diseases is, of course, dissimilar, many features cause them to present strikingly similar manifestations. They are both pathologically characterized by a focal lesion with a central area of necrosis, the tubercle on the one hand and the Aschoff nodule on the other. In both diseases, exudative and proliferative tissue responses occur. Both diseases are unusually chronic in their course although acute exacerbations are not unusual. In both rheumatic fever and tuberculosis, evidences of allergic reactions have been indicated.

With these parallelisms in mind there seems no reason why many of the accepted doctrines regarding the treatment of tuberculosis should not be emphatically applied to the treatment of rheumatic fever and its sequelæ. I mean, particularly, long periods of complete rest.

Death as a result of acute rheumatic carditis is not common, as is evidenced by the small series of cases reviewed by Thayer and others. However, the eventual toll from cardiac failure is enormous. Few studies have been made which may be said to represent the life cycle of the disease. A few years ago I published the results of a study which comprised 160 patients regarding whom I had reliable data as to the onset of rheumatic fever or chorea and the date and actual knowledge of death from cardiac disease. All these patients presented striking evidence of rheumatic carditis at the time of examination.

The cases were divided into three groups according to the type of lesion found clinically: (1) those with mitral involvement, 124; (2) those with aortic involvement, twenty-one, and (3) those with both mitral and aortic involvement, fifteen. The incidence by sex was equal.

In the group in which there was involvement of the mitral valve, the average age at which the first attack of rheumatic fever occurred, and the presumable time at which the first attack of

rheumatic fever occurred and that at which the heart became involved, was twenty-one years. The earliest age at which the infection occurred was seven years. The average duration of life in this group was only twenty-one years after the first attack of rheumatic fever; the average age at death was forty-two years. Even the maximal age limit was well less than the anticipated normal average.

The statistics for the group with aortic involvement were similar. The average age at which the first attack of rheumatic fever occurred was twenty-one years. The youngest patient at the time of the acute infection was aged seven years. The average expectation of life was, as in the group with involvement of the mitral valve, only twenty-one years after the initial attack of rheumatic fever; the average age at death was forty-three years.

In the third group, made up of those patients with both mitral and aortic involvement, the prognosis was considerably less favorable than for those in the other two groups. The average age at which the acute infection occurred was sixteen years; the earliest recorded age was eight years. The average expectation of life was only sixteen years after the first attack of rheumatic fever; death occurred at the average age of thirty-two years. The patient in this group who lived the longest lived forty-nine years.

This study did not show that recurrent rheumatic fever particularly influenced the expectancy of life from the standpoint of carditis, although this probably would not hold true in a larger series of cases. Recurrences occurred most commonly in the first decade of life and were recorded in 55 per cent of the cases. An instance of recurrent rheumatic infection did not occur after the thirtieth year of life.

Comment

Until the etiology of rheumatic fever is established, a certain specific therapeutic agent will not be available. It is doubtful that even with such knowledge, a specific cure would be forthcoming. It is imperative, therefore, that active steps be taken to institute measures that are supported by scientific reason and that may be instrumental in minimizing the incidence of rheumatic fever. Foremost among these measures are enforcement of the doctrines of hygiene and education of the laity, particularly regarding the care of children.

The eradication of foci of infection is important, although no one would venture to offer such a procedure as a positive measure of prevention. The removal of infected tonsils is unquestionably indicated, although rheumatic fever occurs in cases in which tonsillectomy has been performed successfully and in which other foci of infection have not been demonstrable. It is difficult to obtain reliable data on the influence of removal of foci of infection as a preventive measure, for in a large series many cases will occur in which removal has been incomplete.

One of the most important measures to be advocated in the treatment of rheumatic fever is a sufficiently long period of rest in bed. If carditis is present or is suspected, the period of rest should occupy months and not weeks.

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OBLITERATING ARTERIAL DISEASE*

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AS an involution process, arteriosclerosis is natural with old age, and is the expression of the natural wear and tear to which the arterial tubes are subjected during the stress and strain of life. Longevity is a vascular question, which has been well expressed in the axiom that "a man is only as old as his arteries." To a majority of men, death comes primarily or secondarily through this portal.

The development of arteriosclerosis is influenced by heredity, infections, alcohol, lead, the toxins of disturbed metabolism, etc. There are men in the fifth decade of life who have never had any special disease, who have eaten and drunk with discretion, in whom arteriosclerosis seems to come on as a direct result of a high pressure life.

Peripheral arteriosclerosis affects the lower extremities more frequently and more severely than the upper, owing to the greater strain upon the vessels because of the upright position and because of poorer collateral circulation. There is a deposit of newly formed connective tissue in the blood vessel walls probably due to some irritative reaction. The connective tissue thickening of the arteries may extend to a degree which will cause symptoms from inadequate blood supply to the parts before calcification has developed. Calcification alone does not produce obstruction; some of the most extensive cases of gangrene occur when no calcification can be demonstrated. The calcium deposits in the blood vessel wall may project through the inner coat and serve as an object for the deposit of platelets with the formation of an obstructing thrombus. Proliferation of the intima may cause total closure of the small arteries. Total closure of the larger arteries probably never occurs from proliferation of the intima in itself; thrombosis is necessary for occlusion. The veins also sclerose in the arteriosclerotic process.

Among the early symptoms of arteriosclerosis of the lower extremities are numbness, a burning sensation, a feeling of weakness in the feet while walking which disappears on resting, and coldness of the feet. Later, there will be pain after the patient has walked a short distance. Occasionally the pain may be referred to as lightning pain in the calf of the leg. When the arteries of the leg are obstructing the arterial flow to a still greater degree, intermittent claudication will be nature's call for more blood to the part. This is a severe cramping pain of such intensity as to compel the patient to stand or sit down and rest for a time before he can resume his walking. As the disease advances, there may be a shooting, boring pain while at rest. This pain resembles neuritis and may involve the entire ex-

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tremity or only certain areas, as the distal part of the foot. Often it is most marked around the nail bed of the great toe. If the patient has in addition an ingrowing toe nail and operative treatment is undertaken, it may precipitate infection and gangrene due to insufficient blood supply. It is very important to determine that there is sufficient arterial circulation in an extremity before any minor surgical operation is undertaken.

Careful examination of the extremities will often yield important information and should be carried out in detail with the patient's clothing removed. Early diagnosis of incipient cases is important as they offer the best opportunity for successful therapy.

Among the objective findings to be looked for are muscular atrophy due to impaired circulation and restricted activity due to the discomfort of prolonged walking. Roentgenograms may visualize bone atrophy. Trophic disturbances may be seen in the later stages as a thin, dry atrophied skin. The toe nails will lose their normal pinkish color and become dry, brittle, deformed and slow in growth.

Attention to color changes of the extremities will result in the recognition of a larger number of cases of peripheral arterial disease. In moderate degrees of arterial obstruction there may be no appreciable change from the normal pink color of the extremities. In more advanced cases, the foot may be very pale; in others it may be of a dusky red or cyanotic color. In very advanced cases, a deep cyanosis may persist while the patient is in the horizontal position. If such a foot is cold to the touch and the cyanosis does not disappear on pressure, impending gangrene may be anticipated.

Ischemia is a very important sign of arterial insufficiency of the extremities. If the obstruction is insufficient to cause blanching in the horizontal position, the extremities should be elevated to 35 degrees, thus adding the effect of gravity to the arterial obstruction in the production of the ischemia. The appearance of an induced ischemia by the rapid flexion and extension of the feet using the ankle joints as pivots, while the extremities are horizontal, pendent or elevated, is an important diagnostic sign of insufficient circulation. In advanced cases rubor appears after a few seconds of pendency and may extend to the knee. In milder cases it may involve the distal part of the foot or toes only. Rubor is not as important a diagnostic sign as ischemia.

The surface temperature can be fairly accurately determined by palpation with the palm of the hand. The thermocouple determination is, however, more accurate. It may be assumed that the warmth of an extremity is directly proportional to the volume of blood circulating in the part and that cold extremities are due to insufficient circulation.

Assuming that there is no myocardial weakness, the amplitude of the pulsation in the peripheral arteries will give a fair indication as to the patency of the arteries.

Thromboangiitis obliterans (Burger's Disease) should be differentiated from obliterating arteriosclerosis. It is a disease of the arteries of young or middle aged adults interfering with the local flow of blood in segments of the vessels. There is a chronic inflammation of the arteries and veins associated with a thrombosis occluding the lumen and binding the vessels and nerves together. After a variable period of time, other segments of the vessels undergo a similar process. Calcification of the arteries is not a factor but in the early stages vasoconstriction may play a part. The cause is unknown. Most of the patients are heavy cigarette smokers. It is most frequent in Hebrews. About 85 per cent of the patients are males. Migrating phlebitis occurs in about 40 per cent of the cases of thromboangiitis obliterans. It may occur in any part of the foot or leg up to the groin. The final result of the disease depends upon whether or not collateral circulation can be developed fast enough to keep up with the extension of the occlusion by the thrombo-inflammatory process.

Raynaud's disease should not be difficult to differentiate. It is a vasomotor disturbance of the constrictor type. Raynaud based the diagnosis on: (1) attacks of pallor, cyanosis or redness initiated by cold or nervous excitement and relieved by the application of warmth; (2) symmetric bilateral distribution; (3) gangrene which, if present, is superficial and confined to the skin; (4) absence of occlusion of the peripheral arteries. A further criterion is that the patients should have had the disease for at least two years to make certain of its primary nature. Its cause is unknown. The disease usually occurs after puberty and 90 per cent of the patients are

women. These patients are usually of asthenic build, have a small heart, low blood pressure and evidence of vascular deficiency. Most cases are mild and progress slowly without destruction of the skin and finally become stationary or disappear. A few cases progress and cause ulceration of the fingers and toes with occasional destruction of the distal phalanges.

Embolism and thrombosis of the peripheral arteries, for all practical purposes, may be considered together since the effects produced are practically identical. The symptoms develop much more quickly in embolism than in thrombosis. In embolism, the onset is that of a sudden severe pain in an extremity, absence of pulse below the point of obstruction. The extremity is cold and white. The artery or even the whole leg is tender to pressure. If collateral circulation is established, the extremity will gradually return to normal. If collateral circulation is not established or embolectomy promptly performed, gangrene will develop.

There is no specific cure for vascular occlusion of the extremities.

Treatment of obliterating arterial diseases of the lower extremities should consist of maintaining and increasing the diminishing local circulation. When there is much pain present, either while walking or at rest, the patient should be put to bed with the legs in a horizontal position until the pain has disappeared, after which walking may be resumed and gradually increased. Some patients have pain while in bed, probably due to an insufficient flow of blood while the extremities are in the horizontal plane. In such cases, elevating the head of the bed so the feet are a little lower than the body will give relief because gravity increases the flow of blood to the feet. After resuming their usual occupation, these patients should rest as much as possible with their legs in the horizontal position. Samuels[2] says, "The popular idea that walking improves the circulation does not apply in cases of arterial disease." Focal infections should be eradicated. Infections of the feet should be avoided and carefully treated if present. Trauma and excessive exercise should be avoided. Tobacco, alcohol and highly spiced food should be prohibited. Efforts should be made to treat the pain without the use of opiates. Fluids should be forced. The application of heat is beneficial when there is no gangrene present. Heat causes a relaxation of vasomotor spasm which usually accompanies organic occlusion of the peripheral vessels. A hot Sitz bath for fifteen minutes once or twice in twenty-four hours with the water at a temperature which feels comfortably hot to the patient is the best method of applying heat. As sensation is often diminished, care must be used in applying external heat by electric bulbs in a cradle, electric pads, infra-red lamps, etc., or the patient will sustain superficial burns which may develop gangrene or infection. Wrapping an extremity in cotton or wool is the safest way of maintaining heat in the extremities. Diathermy is a valuable form of treatment. Burger's postural exercises are helpful. A hot Sitz bath right after the postural exercises seems to increase the beneficial effects of the exercises.

Alternating hot and cold baths using pails high enough so the legs can be immersed almost to the knees are helpful. The immersion in the hot water should be for a longer period than in the cold. As cold is not well tolerated, patients should refrain from swimming or wading in cold water. Protection from cold by wearing high, warm shoes and stockings and living in a warm climate is advisable.

Intravenous injections of 300 c.c. of 2 to 5% solution of sodium chloride every other day appears to benefit some cases. It should not be used if there are cardiac or renal complications.

Of the many drugs used as antispasmodics in the treatment of obliterating arterial diseases, papaverine ranks as high as any.

The intramuscular injection of various tissue extracts have benefited many cases. Schwartzman[3] reports excellent results with the use of extract of stripped muscle. An extract of deinsulinized pancreas made by Sharp and Dohme and marketed as Tissue Extract No. 568 has been used with apparent benefit in some cases. The objection to the use of tissue extracts is that the vasodilator action of tissue extracts is brief. This necessitates the giving of several injections a day over a long period of time before beneficial results can be expected.

Intravenous injections of typhoid vaccine beginning with 25 million of the killed bacteria may be given. The dose should be increased by 15 to 25 million at each injection until a good reaction is obtained. A course of ten to twelve injections should be given at weekly intervals, after which

rest for four to six weeks, when the course is repeated. Typhoid vaccine intravenously is contraindicated in the presence of infection, hypertension, myocarditis, and debility.

The use of apparatus for causing intermittent pressure and suction in the treatment of chronic occlusive arterial disease has become somewhat popular. I have not had enough experience with this form of treatment to form an opinion as to its value. I quote the conclusions of Allen and Brown[1] of the Mayo Clinic in a recent paper on the subject: "The intermittent suction and pressure treatment of chronic occlusive arterial diseases increases the skin temperature temporarily, may relieve the pain of ischemic neuritis and trophic changes, and may induce healing of ulcers. It is not clear that these results are superior to those following other methods of treatment. However, it is our impression that the pain of ischemic neuritis is relieved to a greater degree than is ordinarily observed. As a result of our experiences we believe that passive vascular exercise constitutes some, but as yet poorly defined, contribution to the treatment of vascular disease."

When, by the various tests, it can be demonstrated that there is a considerable element of vasoconstriction present, lumbar sympathectomy will increase the flow of blood to the extremities. It is contraindicated in the aged, in the presence of gangrene or extensive ulceration.

In obliterating arteriosclerosis, all of the arteries have a diminished caliber. This reduces the amount of blood going to the part and retards the development of collateral circulation. When diabetes is a complication, the arteriosclerosis progresses more rapidly, making this form of obliterating arterial disease the most difficult to treat successfully. In thromboangiitis obliterans, we are dealing with a younger group of individuals who have a greater ability to resist infection. In this form the obliterating process involves only sections of the arteries, the uninvolved arteries retaining their normal caliber which permits the free flow of blood to the vicinity of the obstructing arteries, making the establishment of collateral circulation easy. This is also often the case in embolism and thrombosis. When there is reasonably good circulation to the vicinity of the obstructing vessels, a good line of demarcation may form, in which case nature will separate the gangrenous parts.

If gangrene develops, the patient should be kept quiet in bed with the extremities in the horizontal position. Elevation reduces the blood flow by gravity. When the leg is in the pendent position, edema develops and impairs the circulation.

When there is a spreading gangrenous process which shows no signs of establishing a line of demarcation, when there is an uncontrollable infection threatening life, or in the presence of unbearable pain, amputation must be resorted to.

To determine the level of amputation, several tests should be made. A level of abrupt temperature change as determined by the hand, clinical skin thermometer or thermocouple, palpation of the main vessels and oscillometer readings are all valuable aids. The intracutaneous salt solution absorption test in which 0.2 cubic centimeters of 0.85 per cent sodium chloride solution is injected at four inch intervals down the limb. Normally the wheal should remain sixty minutes. In circulatory deficiency, the absorption time is reduced markedly. It must be remembered, however, that a well nourished skin may cover non-viable deeper tissues. The intracutaneous histamine flare test gives the same information.

Amputation may be limited to gangrenous toes if the dorsalis pedis or posterior tibial pulses are palpable. If either is not palpable, there should be good circulation as evidenced by a warm foot of good color in all positions, freedom from severe pain, a good salt or histamine test with a reasonably good oscillometric reading, and a good line of demarcation. If these conditions are not present, a higher amputation must be done. If all of the above conditions are present in the mid-leg with a good pulsation in the popliteal artery, a mid-leg amputation may be sufficient. When the above conditions are not present in the leg, a thigh amputation is indicated. In the presence of infection, a circular open amputation is safest.

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OXYGEN THERAPY*

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OXYGEN as a medical aid is familiar to the public as a dramatic element of newspaper headlines, describing the last desperate efforts to save the life of the king, some rich man, or a prominent politician. It is a common instrument in the hands of the fire department, which rushes a pulmotor to the scene in case of a drowning or carbon-monoxide asphyxiation. The public, the officials, and the doctor are all satisfied, even with a report of the subsequent death of the patient, on the theory that since oxygen was used the patient had been given every chance that science could offer him. But the use of oxygen as an adjunct to other methods of treatment in the general practice of medicine is as yet uncommon and unfamiliar to both patient and physician.

History of Clinical Use

The importance of oxygen has long been known in chemistry, but its clinical value was first significantly recognized by Haldane in 1917, when he used it in certain cases of war gas poisoning. In the same year Meltzer, in the United States, found it of value in cases of pneumonia. Barach, in the Presbyterian Hospital in New York, and Boothby, in the Mayo Clinic, demonstrated the clinical value of oxygen by placing the patient in oxygen chambers whenever there was definite evidence of oxygen want in blood and tissues.

Physiology of Oxygenation

Fresh air contains 20 per cent oxygen and 80 per cent nitrogen. In respiration oxygen is taken up by the hemoglobin in the blood, circulating through the capillaries in the alveolar walls of the lungs. The oxygen is then carried to the tissue cells to be used in various metabolic processes. The principal end product of oxidation is carbon dioxide, which in turn is carried back through the blood to the alveolar walls. The percentage of oxygen and carbon dioxide in the alveolar air and in the blood is practically kept in constant equilibrium. Requirements for normal respiration are:

1. That there be sufficient oxygen in the inspired air.
2. That respiration must be both of sufficient frequency and of depth to introduce enough oxygen into the alveoli.
3. That a sufficient number of alveoli must be open so that oxygen can reach the pulmonary capillaries.
4. That the alveolar walls must be permeable.
5. That there must be enough hemoglobin in the blood, and the hemoglobin must have a normal oxygen carrying power.
6. That there must be an adequate circulation of blood in the lungs and throughout the body to distribute the oxygen to the cells of the body tissue.

Abnormal Oxygenation

Any condition which destroys the normal absorption of oxygen in the lungs, any condition which reduces the circulation of oxygen throughout the body, any condition which causes a stagnation of circulation in the tissues, results in a depletion of oxygen and an increase of carbon dioxide in the cells of the body. This condition in itself produces a disturbance of the physiological functions of the organs, independent and in addition to any pathological process from which the body may be suffering. Such a status produces a strain on the body which in itself may be more serious than the disease.

There are three conditions which produce an increased demand for oxygen.

1. Sudden ascent to a high altitude.
2. Violent exercise.
3. Certain diseases.

All of these cause an increase in heart action and in respiration. In healthy normal individuals there is a normal reserve power with which to meet this demand. Beyond a given point the demand exceeds the capacity for response and the symptoms of oxygen want begin to exhibit themselves. The faster the heart beats the less time there is for rest and recovery between contrac-

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tions. As the energy of the body is dissipated the reserve capacity is lessened, and the ultimate effect is exhaustion.

Oxygen Want

The following symptoms may be enumerated:

1. Mental disturbances, such as headache, anxiety, impaired understanding, and delirium.
2. Air hunger.
3. Pain in the chest.
4. Vomiting.

The objective evidences of lack of oxygen are:

1. Respiratory disturbance evidenced by yawning, irregularity, stertorous, depressed or periodically arrested breathing.
2. Rapid, irregular pulse ultimately becoming slow.
3. Muscle-twitching or convulsive movements.
4. Dilated pupils.
5. Cyanosis.

It should be emphasized that cyanosis is one of the late signs indicative of oxygen need. While waiting for cyanosis to appear, it is a common experience not to recognize the earlier symptoms.

Physiology of Oxygen Therapy

There is only one factor in the respiratory problem which remains constant, that is, the available oxygen in the air in a normally ventilated room. All other factors are subject to change in the presence of disease. Two of these are compensating factors up to a given reserve point. The heart may increase in rate to circulate the available oxygen. The respiratory rate may be speeded up to draw in more oxygen. However, the vital capacity of the lungs may either remain the same or actually be reduced, as in the case of consolidation of the lung in pneumonia or in pulmonary edema. The more rapid the heart rate, the weaker the beat becomes. The more rapid the respiration, the more shallow it becomes. All of this leads to fatigue. The simple and logical way to break this vicious circle is to increase the oxygen concentration in the inspired air. This will permit a reduction in both the heart rate and in the respiratory rate. It will reduce fatigue and save the circulatory reserve power for the important task of meeting the increased demand of combating the disease. By practical experience it has been found best to raise the oxygen concentration to between 50 and 60 per cent. To accomplish this requires a flow of between four to six liters of oxygen per minute, regardless of what type of apparatus is used. The simplest clinical guide for the indication of a satisfactory amount of oxygen is the pulse rate. When the high pulse rate drops to a better level approaching normal, then the oxygen concentration should be maintained as satisfactory.

Medical Indications for the Use of Oxygen

1. *Lung Conditions.*—These include pneumonia, massive collapse, pulmonary edema, pulmonary emboli, atelectasis, simple cyanosis of the new born, and premature infants. In these conditions the capacity of the lung to absorb oxygen is reduced. In proportion to the reduction in the vital capacity of the lung, there is a failure of oxygen throughout the body. The associated toxemia of the heart muscle reduces the compensatory mechanism of circulation. The vicious circle increases, and the symptoms of oxygen want may soon be so aggravated that they may overshadow the original pathology and become the deciding factor in the death or recovery of the patient. If more oxygen is made available, the oxygen want may be overcome in spite of the restricted capacity of the lung; as more oxygen reaches the tissues there is less demand on the heart and on respiration. This permits a slowing of the heart rate, and a corresponding conservation of the reserve strength of the cardiac muscle. Greater comfort is obtained by making breathing easier, and this permits rest and sleep. In the presence of a self-limited disease this conservation of the heart brings the patient through the crisis, or prolongs life until the immunity mechanism is given a chance to conquer the infection. The failure to recognize the symptoms of oxygen want, and the failure to utilize the simple means of supplying the necessary oxygen is a serious neglect in the light of present knowledge.

2. *Heart Disease.*—The addition of oxygen therapy is particularly valuable in cases of advanced decompensation. Coronary thrombosis, and myocardial insufficiency reduce the capacity of the heart to maintain general circulation. A corresponding reduction in the distribution of oxygen to the tissues results. This sets up an increased demand for cardiac effort, forcing a

response of increased heart rate. The fatigue thereby induced weakens the beat and a vicious circle is created. The addition of oxygen therapy lessens the demand and permits the heart to beat more slowly, affording it an opportunity to recover from the acute disturbance. The addition of oxygen in assisting to reëstablish a more normal circulation increases diuresis, and as the edema is reduced, an added burden on the cardiac muscle is removed.

Oxygen therapy should therefore be kept in mind in the treatment of cardiacs who show evidence of oxygen want, and who do not respond promptly to the usual measures.

3. *Toxemias.*—Carbon monoxide in cases of poisoning combines directly with the hemoglobin, and in direct proportion to the amount present in the red blood cells it destroys the oxygen carrying power of the blood. A generalized toxemia is produced and the symptoms of oxygen want become evident. Relief by addition of oxygen therapy should be prompt and continuous, until the toxic products have been completely eliminated.

The use of oxygen in the presence of postoperative thyrotoxic crisis is of proven value in slowing the heart rate and maintaining equilibrium until the temporary disturbance is past. The value of oxygen in convulsive eclampsia has been of striking benefit in eliminating cyanosis, combating pulmonary edema, and assisting the heart through the temporary crises.

Other pathological conditions in which oxygen therapy is of value fall under one of three classes already described, pulmonary, cardiac, and toxemic complications. The indications and the results are the same.

Methods of Administering Oxygen

The available methods of administering oxygen are:

1. The oxygen chamber or room.
2. Oxygen tents.
3. The nasal catheter.
4. The open mask.

The oxygen room is too expensive to build or to operate to be practical, costing about $1,000 for a portable room and up to $4,000 for a permanent room. With the exception of the cost, it is an ideal method.

The oxygen tent is satisfactory for the average hospital, costing about $300 and supplying any amount of oxygen concentration required. Occasionally a patient may object to being confined in the tent, but a short release soon convinces him of the greater comfort within.

In the use of the nasal catheter method, a very economical and satisfactory portable system is available to any patient. It is important that the tip of the catheter be kept exactly at the level of the lower end of the uvula and fixed at this point to permit the flow of oxygen to be inspired into the lungs. It is also necessary to pass the oxygen through a special humidifier to prevent irritation to the posterior pharynx. A gauge to determine the rate of flow completes the required apparatus under this system.

The open mask method is not satisfactory, but it has some value in emergencies for a short time treatment.

Conclusions

Oxygen therapy has a definite place in modern medicine.

It is strictly an adjunct to other treatment.

Its indications are easily understood.

The methods of its use are simple.

It should be used more generally.

Smallpox Vaccine (From Chick Chorio-Allantoic Membrane)—Lilly

The Council on Pharmacy and Chemistry reports that Eli Lilly & Co. requested consideration of its smallpox vaccine made by using chick chorio-allantoic membrane instead of the usual calf lymph. The firm holds that its method of preparation eliminates the hazard of bacterial contamination and gives an improved preparation of uniform potency, diminished virulence and immunizing quality at least as high as that of the vaccine prepared from calf lymph. In support of the claim of equal potency with that of calf lymph the firm presented comparative charts of potencies of the finished produce as filled into the capillary tubes and placed on the market. As evidence for the clinical effectiveness of the product, the firm presented reports of its use by Drs. Frank D. Ryder and Carl J. Lund of Minnesota. The Council considered the submitted evidence favorable but insufficient as yet to justify the acceptance of Smallpox Vaccine (from Chick Chorio-Allantoic Membrane)—Lilly for inclusion in New and Unofficial Remedies. The Council, therefore, postponed consideration of the product to await the development of further confirmatory evidence of its value. (J. A. M. A., September 19, 1936, p. 967.)

THE MANAGEMENT OF THE MINOR AILMENTS OF PREGNANCY*

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THE disorders to be discussed in this paper are met with very frequently in the experience of any doctor practicing obstetrics. They are not matters of life and death. They seldom incapacitate the patient. Sometimes the physician must even elicit the complaint; yet in the daily economy of life of the pregnant woman they are very important and distressing, and only too frequently not given the care that they deserve by the medical advisor.

Some of the problems are not purely obstetrical and for that reason are largely neglected in the obstetrical literature. But one must be alert to their importance during the gravid state in order to manage them intelligently. As a basis for a statistical estimate of the frequency of these complications, data has been collected from one hundred consecutive cases in private practice. The results will be indicated in connection with the various complaints.

Vaginal Discharge.—Vaginal discharge during pregnancy is troublesome to about half of all gravidas. In general there are four main causes. The pelvic congestion attending pregnancy often increases the secretory activity of the cervical glands, particularly in the presence of a mild, nonspecific endocervicitis. Cautery of the cervix which is such an excellent measure in the nongravid state has been suggested as treatment, even during pregnancy, but seems rather hazardous. The cervix in this instance is better left alone or treated conservatively with 10 per cent silver nitrate. The treatment of gonorrhea in pregnancy requires no special discussion here. Trichomonas vaginitis may be treated in any of the approved manners. We have found a 5 per cent mixture of quinine sulphate in kaolin blown into the vagina to be as satisfactory as anything. The fourth cause of vaginal discharge during pregnancy merits special comment.

A vaginitis caused by monilia of the yeast family is met with not infrequently in any gynecological practice. During pregnancy the incidence is from two to three times as great. The clinical symptoms are burning and itching of the vulva associated with a rather profuse yellow vaginal discharge. The appearance of the vulva is red and irritated with occasional ulceration around the hymenal ring. The walls of the vagina are hyperemic and covered by material having the appearance of yellow cottage cheese. There frequently is slight bleeding upon wiping the discharge from the mucosa. The gross appearance to the trained eye is practically diagnostic, but the microscope is a distinct aid. On a stained smear the organism is gram positive and one sees the long strands of mycelia with the buds projecting from the sides.

This infection may cause very marked discomfort for the patient and not infrequently for the doctor as well. It is very refractive to nearly all forms of treatment except the application of gentian violet. This drug is best used in 1 per cent aqueous solution applied topically to the vaginal walls after the discharge has been wiped away. A cure results promptly in the majority of cases in from one to four treatments, but recurrences two to three weeks later are very common until the end of the pregnancy. I have found in a few cases that the accompanying ulceration has failed to respond to anything but administration of vitamin B complex in the form of brewer's yeast and have the feeling as yet unverified that a deficiency of this accessory food factor may definitely favor moniliasis. It is generally accepted that vitamin B and G requirements during pregnancy are two to three times normal so that relative deficiencies would likely be more frequent at this time.

Backache.—Pains in the sacro-iliac and lumbosacral regions constitute one of the most common and troublesome complaints of pregnancy and the few months following delivery. In this series of one hundred women, thirty-two had moderate and twelve had severe low backpain during pregnancy, a total of forty-four. The same complaint was even more prevalent in the few months following pregnancy with twenty-nine moderate and twenty-two severe, a total of fifty-one.

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The wide female pelvis whose architecture was evidently never designed for bearing as much weight as assumption of the erect posture has placed upon it, greatly favors sprains of the sacro-iliac joints. The general pelvic congestion incident to pregnancy softens the ligaments maintaining the pelvic bones in apposition. The hormone, relaxin, which Hisaw in 1929 isolated from the corpus luteum appears to have the specific function of relaxing the ligaments surrounding the pelvic synchondroses. The use of high heels and the forward pull of the large abdomen are exciting factors because they tend to exaggerate the lumbar curve. All motions of stooping and lifting put great strain on these joints. Obesity increases the hazard. These forces during pregnancy so weaken or sprain the posterior pelvic joints that the necessary frequent lifting of the baby and stooping incident to its care, not only prevent healing, but greatly aggravate the condition, resulting in chronic sprains which are too often incapacitating because of their severity. I routinely warn my patients of the danger of low back sprain and caution them against all lifting during pregnancy. The use of a properly fitting maternity girdle designed to bind the pelvis and prevent increased lumbar lordosis is an excellent prophylactic measure.

Treatment of the condition when it has once become established includes first and foremost avoidance of the particular trauma which has precipitated the trouble, namely, stooping and lifting. Hot packs to the back and use of a girdle are advisable and such simple advice as changing the baby's diapers and bathing it on a table high enough to make stooping unnecessary, and early training of the child to get into bed and onto the toilet by itself, make for less unavoidable strain on the back joints, permitting them to recover more readily.

Low Abdominal Pains.—After a differential diagnosis of low abdominal pain has ruled out appendicitis, cystitis, ureteral colic and many other definite entities, there still remains a large group of pregnant women who suffer from unilateral or bilateral low anterior abdominal pains. Some of these are referred from sprains of the sacro-iliac joints and are improved by proper support of the pelvic girdle. Many disappear when a previous calcium deficiency is overcome. Still others persist in spite of treatment. As a general rule it is very worth-while to explain to the patient that she is not suffering from appendicitis (for that is usually her diagnosis) or any serious disorder, but that the pains are common in her state and are due to pressure and stretching of the uterus and its supports as enlargement is taking place. Such a simple explanation puts her mind at rest and is often a very good adjunct to other therapeutic agents in relieving this symptom.

Leg Pains and Cramps.—The incidence of these uncomfortable symptoms in this series was 40 per cent, including 13 per cent severe. The causes are mainly two in number: (1) relative anoxemia of the muscles resulting from poor circulation due in turn to pressure on the veins draining the lower extremities; (2) hypocalcemia. This complaint can be relieved by prescribing an adequate calcium ration and by elevation of the foot of the bed slightly at night to aid venous return. During the day it is well for the patient to rest with the feet elevated at least as high as the hips, rather than with the feet on the floor.

Inasmuch as the requirements of the antineuritic vitamin B are increased during pregnancy, the idea presents itself that many of the pains experience during the gravid state are neuritic in origin due to deficiency of this specific substance. I am employing brewer's yeast at present in an effort to combat those pains not controlled by the above treatment, but have no definite data as yet.

Teeth.—The old saying "a tooth for every child" is still too much with us. General dental health is poor enough at best. In pregnancy the tendency to caries and other dental disorders is enhanced to the extent that 36 per cent of this series reported definite increase in incidence of cavities. All of these women had private practice prenatal care. We know that tooth conditions in under-privileged groups are much worse. The heavy demands for calcium made upon the maternal organism by the fetus partly explains the difference. Dietary restrictions imposed upon the mother by hearsay and superstition contribute to this state of affairs. A general routine aimed at dental prophylaxis during pregnancy should include preferably three visits to the dentist during the nine gravid months and two dur-

ing the period of lactation. The present emphasis on the importance of vitamin C in tooth and gum health points to a tumbler full of orange juice daily as the minimum adequate vitamin C ration. The recent commercial availability of crystalline vitamin C or cevitamic acid suggests its use where fruits are contraindicated or not well borne. Vitamin D (and incidently vitamin A) requirements are met by daily administration of two tablespoonsful of U.S.P. cod liver oil or its vitamin equivalent in concentrates or substitutes.

Obtaining an adequate daily calcium ration is often a very poorly met problem. The normal requirement in the non-gravid state is stated by different workers to be between one-half and one gram of elemental calcium daily. The fetus uses varying amounts of this mineral, actually needing nearly a gram per day during the last two months. The average diet exclusive of milk contains about .4 gram of calcium daily. To be thoroughly on the safe side and aim at 1.5 to 2 grams daily in the maternal diet, one must prescribe in addition three pints of milk daily, or calcium lactate to the extent of 12 grams (three teaspoonsful) daily; or calcium gluconate in amounts of 17 grams (one well-rounded tablespoonful) daily; or dicalcium phosphate to a total of 8 grams (two well-rounded teaspoonsful) daily. These amounts may seem at first glance to be excessive. However, it is not generally appreciated that calcium gluconate contains only 9 per cent calcium, the lactate 12 per cent calcium, the dicalcium phosphate about 25 per cent calcium and milk 1 gram per quart. Actually, milk contains more calcium than lime water. The great prevalence of symptoms referable to low blood and tissue calcium content which one sees with the ordinary small calcium ration prescribed makes it seem that we often err on the side of conservatism in dosage. The details of dietary requirements mentioned here in connection with the teeth applies equally to the problem of leg cramps, low abdominal pains and even somewhat to the toxemias.

Anemia.—Anemia during pregnancy is classified according to whether it is hyperchronic and macrocytic, or hypochromic and microcytic.

Of those gravidas with a hemoglobin below 45 per cent, about one-sixth have the macrocytic type. This group carries a mortality of 65 per cent if untreated. Management is the same as for Addisonian pernicious anemia with liver the specific therapeutic agent.

The microcytic anemias met with in pregnancy usually respond to large doses of iron. Those cases which do not progress favorably with iron alone are usually associated with a gastric achlorhydria and do well if hydrochloric acid is prescribed in addition. Routine hemoglobin determinations are as essential to adequate prenatal care as urinalysis, weight and blood pressure determinations. It is well to recommend meat once daily to the expectant mother for otherwise she often follows the advice of friends and denies herself the iron and other hematopoietic factors in this food.

Pyelitis.—In passing, I might just mention that results in our hands with the use of methanemine given by vein are far superior to the usual oral medications; and also the use of the ketogenic diet has proved quite satisfactory in this condition, provided of course that there is no anatomically defective drainage of urine.

Varicosities of the Vulva.—These are occasionally encountered during pregnancy and may be associated with marked discomfort. This is relieved by the use of a vulval pad, fastened in front and back by heavy elastic to a girdle so that constant pressure against the perineum is maintained.

Pyrosis.—Heartburn in the last trimester was present in over a third of this series and severe in 15 per cent. This condition probably results from the mechanical encroachment of the uterus upon the confines of the upper abdomen and interference with adequate biliary drainage and emptying of the stomach. One finds on careful questioning that it is usually associated with the ingestion of fatty foods. Elimination of butter, cream, and ice cream as well as fat meat and nuts from the diet relieves the condition considerably and symptomatic relief from soda or other alkalies usually solves the remainder of the problem. Occasionally mild sedation is of value.

Constipation.—The universal complaint of constipation is accentuated during pregnancy. The ideal treatment of course would include no drugs at all, but would place great emphasis on a regular habit time shortly after a meal to take advantage of the gastro-colic reflex. The inges-

tion of a daily total of at least two cupsful of those five per cent vegetables which contain much indigestible cellulose, and two glasses of water half an hour before each meal in addition to the liquids at meal times are also of great value. Plenty of walking helps. All laxatives have disadvantages. They seldom are more than temporarily palliative. Any strong purgative may stimulate the smooth muscle of the uterus as well as the bowel. The continued use of magnesium compounds is contraindicated because of the fact that the ingested magnesium tends to mobilize and bring about excretion of increased amounts of calcium, which is at a premium during pregnancy. Mineral oil and those preparations containing it and agar agar in addition represent probably the best medicinal agents. It must be borne in mind, however, that the vitamines A and D so precious during pregnancy are oil soluble and it has been demonstrated that they may be carried out with the mineral oil. For that reason the vitamines should be administered as far removed as possible in point of time from the mineral oil. Adequate management of constipation of course materially decreases the incidence of hemorrhoids and other related complications. In this series constipation was moderate in twenty-eight and severe in twelve, a total of forty in 100 cases.

Vomiting of Early Pregnancy.—This symptom occurred in 47 per cent of the series including 15 per cent severe. There are only two phases of its management that I wish to mention. The tendency has been to regard this condition largely as a neurosis. We are becoming aware that glandular dysfunctions frequently lay the groundwork for nervous disorders. We know that the withdrawal of the follicular hormone at the menopause is associated with marked nervous hyperactivity. It has been demonstrated that this important leavener of the nervous system is often decreased in the early months of pregnancy. Actually it is observed that administration of follicular hormone frequently controls this vomiting. Dosage will vary from 100 to 250 rat units at three to six day intervals.

A warning should again be sounded of the grave danger attending hyperemesis gravidarum in the resulting avitaminosis, particularly of vitamines B and C and every effort should be made to provide these important factors.

Early Toxemia.—The signs of early toxemia such as a moderate elevation in blood pressure, edema and too rapid weight gain, and moderate albuminuria, appear very frequently in the last trimester. Statistically this complication occurs with less frequency in those women who are already receiving adequate calcium and vitamin D. They are almost always influenced somewhat favorably by addition of calcium and vitamin D to a previously deficient diet. The large majority of these patients improve readily if placed upon a regimen including rigid restriction of fluid intake to one quart daily, drastic reduction of sodium chloride intake, mild sedation and a daily cocktail of half a glass of water with one level tablespoon of magnesium sulphate to favor elimination of water as well as wastes from the bowl. Those who do not respond to this general form of treatment should be observed very closely lest they become more toxic and require prophylactic premature induction of labor.

Summary

A few of the common minor ailments of pregnancy have been discussed with suggestions for their management. Data from one hundred pregnancies in private practice have been tabulated to give an idea of the relative incidence of these disorders.

SYMPTOMS AND SIGNS WHICH MAY MAKE POSSIBLE THE EARLIER RECOGNITION OF CARCINOMA OF THE STOMACH*

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WE are reminded constantly of the fact that within the scope of our present knowledge the only solution to the problem of successful treatment of carcinoma of the stomach lies in earlier diagnosis and in earlier surgical eradication of the disease. But how is earlier diagnosis to be made? This question is particularly pertinent in light of the statement in a recent book on the stomach and duodenum that, "It cannot be too strongly emphasized that it is extremely difficult for even the most able clinician to make an early diagnosis of carcinoma of the stomach."

It is quite clear that the competent roentgenologist, of all physicians, is the one most likely to be able to make a diagnosis of this disease in its earliest stages. But the physician who uses roentgenologic methods for diagnostic purposes cannot make an early diagnosis unless he examines patients in whom there is frequently no more than a suspicion of the presence of the disease. Consequently, it is up to us practitioners to be on the alert for those signs and symptoms which will make us suspicious of the possibility of gastric malignancy and to advise and insist on careful roentgenologic examination when such symptoms occur. If we will depend more on suspicion and less on definite diagnostic features in our demands for roentgenologic study, the diagnosis of early carcinoma of the stomach will be made more frequently; if on the other hand we wait until we can make a definite diagnosis by clinical means, the lesion will more often than not prove to be inoperable.

There is no characteristic clinical history of early malignant disease of the stomach. In fact, patients with extensive lesions not infrequently present a variety of clinical syndromes. This is because symptoms depend principally on the pathologic type and situation of the lesion, and to some extent on the reactivity of the individual (whether he is hypersensitive or hyposensitive). Lesions near the pylorus are more likely to lead to obstruction, whereas those high in the fundus of the stomach will more often produce anemia, loss of weight and strength, and vague dyspepsia.

I should like to emphasize particularly that to be suspicious of the presence of gastric carcinoma in the patient who sits before him, the physician does not need elaborate laboratory equipment—he needs use only his clinical judgment and ability. If he will give consideration to the history, the appearance of the patient, and the results of physical examination, particularly the first, the history, then he will have made the first step leading to early diagnosis of the disease. Only occasionally will these signs fail him and the ordinary procedures of gastric analysis, blood count, and studies of occult blood in the stool alone lead him to suspect the possibility of this disease.

History

In cases of disturbances of gastro-intestinal function the history is the most important diagnostic feature. It is the occurrence of symptoms which leads the patient to the physician; the character of the history leads the physician to suspect disease or an abnormality in function of the digestive tract, and it should lead in many cases to careful roentgenologic examination.

Carcinoma of the stomach, in the early symptoms it produces, may mimic a variety of diseases. The patient may give a history in which the outstanding feature is a so-called typical dyspepsia or the dyspepsia may be like that of peptic ulcer; on the other hand anemia, symptoms of pyloric obstruction, or a general decline in health or nutritional disturbances may be the significant factors.

The so-called "typical" history of this disease is, unfortunately, too commonly emphasized; I say "unfortunately" because so often when the symptoms are clear cut the disease is already hopelessly advanced. The characteristics of this typical history are as follows: The patient, usually middle-aged, says that he has had per-

*From the Division of Medicine, The Mayo Clinic, Rochester, Minnesota. Read before the meeting of the Minnesota State Medical Association, Rochester, Minnesota, May 4, 1936.

fect digestion until the gradual or rapid onset of dyspepsia, characterized by anorexia, fullness and discomfort after meals, belching, burning and nausea, and occasionally vomiting with loss of weight and strength. The story is usually of a progressive condition; but only one instead of all of these symptoms may be present. Not infrequently the patient is emaciated and is aware of the presence of an abdominal mass before he consults his physician. It is interesting to note how frequently these symptoms begin following an apparently acute infection accompanied by loss of weight—"flu" or "intestinal flu," as the patient so often describes it.

It is particularly important to emphasize that carcinoma of the stomach not infrequently leads to dyspepsia which so closely simulates that of peptic ulcer that the physician makes the latter diagnosis and occasionally feels so sure of it that he omits roentgenologic studies. The history of an ulcer-type of distress may be of long or short duration. If the patient is of middle age or beyond and gives a history of distress of short duration, or if he has for many years had an ulcer type of dyspepsia which has subsequently changed gradually but significantly, the physician should be suspicious of malignant disease. His suspicions will be further aroused if associated with this dyspepsia there is loss of weight and strength out of proportion to the reduction in the intake of food.

Anemia is one of the commonest findings in cases of malignant disease. Anemia, which may be the first and presenting symptom in gastric carcinoma, usually depends on the presence of an ulcerating or polypoid lesion. If the lesion is in such a position in the stomach as not to interfere with its emptying, anemia may be present before any other symptom develops. Since the anemia depends principally on oozing from areas of necrosis and sloughing of small vessels, it usually develops gradually and without noticeable loss of blood. Consequently, if a patient presents symptoms of anemia the cause of which is not obvious, the suspicion of oozing from a lesion in the digestive tract, particularly from a malignant lesion in the stomach or cecum, should be entertained.

Patients who present themselves because of a general decline in health, unexplained fatigue, or because of loss of weight and strength not infrequently have malignant disease in the stomach even though gastro-intestinal symptoms are absent. Anorexia may be the only symptom; or pallor and weakness alone may be present. It is important to recall that carcinoma of the stomach may develop in the presence of any chronic disease. When carcinoma of the stomach produces a general decline in health and strength without producing significant digestive disturbances, the lesion is most frequently situated in the fundus or cardiac portion of the stomach. When symptoms of pyloric obstruction or gastric retention develop suddenly or even gradually after an illness of short duration, the possibility of carcinoma of the stomach must be kept in mind. Such lesions practically always involve the pyloric end of the stomach and therefore offer some prospect of resection if not too extensive.

The importance of an adequately taken history in arousing suspicion of gastric carcinoma cannot be overstated. Particular consideration must be given to anorexia or dyspepsia which develops for the first time in an individual past forty years and which persists for more than two weeks. Although in most such cases the disturbance is the result of fatigue, nervous upsets, anxiety, worry, disease in the gallbladder, duodenum or colon, or occurs from dietary indiscretion, nevertheless it is wise to consider the possibility of a gastric neoplasm and to advise roentgenologic study, for if one waits for well-recognized guideposts before making the diagnosis and advising roentgenologic studies, it may be too late. Similar consideration must be given also to middle aged individuals who are subject to chronic dyspepsia in whom new symptoms develop or old ones become intensified. In brief, any change in the usual rhythm of the digestive process which persists for a longer time than usual is the principal feature in the history which should make the physician suspicious of carcinoma.

Appearance of the Patient

Sudden unexplained pallor or a pasty color, obvious emaciation or loss of weight, or any change in the patient's appearance from that of previous good health are not of themselves diagnostic of carcinoma, and they may not even lead one to be suspicious of it. But if they lead the physician to further questioning and to a search

for an explanation, they may be the starting point which will lead eventually to recognition of an early gastric lesion.

Physical Examination

It is questionable if any finding other than pallor on physical examination ever leads to the early diagnosis of gastric carcinoma. Emaciation, a palpable mass, or evidence of metastatic involvement of the left supraclavicular node, the rectal shelf, or umbilicus, are late signs; unfortunately all too often a palpable mass means that the lesion has involved the serosa or contiguous organs. The absence of a palpable mass does not signify that the lesion is operable, however, for it may be on the posterior wall or high under the ribs where it cannot be reached by the palpating hand.

Gastric Analysis

While it may be helpful, it is not essential to make an analysis of the gastric content of patients whom one suspects of having carcinoma. Nothing is more deceiving than the belief that the presence of hydrochloric acid is evidence against the existence of carcinoma of the stomach. In more than 50 per cent of cases free hydrochloric acid will be found. Neither does achlorhydria indicate the presence of carcinoma. In the individual case, the diagnostic value of the level of gastric acidity is usually nil. This does not mean that determinations of gastric acidity should be discarded, for the occurrence of gastric retention, as revealed by a large volume of content, the presence of food remnants in the stomach twelve hours after eating, or of much fresh or old blood, should alone or together demand solution by roentgenologic study. The simple Ewald meal consisting of eight plain cookies and two glasses of water, with aspiration an hour later, should give valuable information in regard to these last named features.

Occult Blood in the Stool

Examination of the stool for occult blood when properly performed may be an extremely valuable diagnostic procedure. However, the field of its usefulness is quite limited. Great care must be exercised in performing the test that the patient does not eat any meat for the three preceding days, and if there is bleeding from the gums or from hemorrhoids, errors may occur. If the test is persistently positive after such precautions have been taken, search should then be made by roentgenologic methods for a lesion in the gastro-intestinal tract. One should not place too much reliance on a negative test as signifying the absence of malignant disease, nor should this test be used to replace roentgenologic methods of study.

Blood Counts

Such a simple procedure as a blood count may frequently lead the physician to suspect carcinoma of the stomach. If unexplained anemia exists, a slowly oozing but otherwise symptomless gastric lesion may be the etiologic factor. Consequently, roentgenologic examination of the stomach is warranted in all such cases. Because of the occasional coincidental occurrence of pernicious anemia and gastric tumors it is wise to advise roentgenologic study of the stomach in all cases of pernicious anemia.

Comment

Unfortunately, in many communities facilities permitting competent roentgenologic examinations of the gastro-intestinal tract are not available. Many laymen are as yet not aware of the necessity of roentgenologic methods of study when dyspepsia is present; nor do they realize the benefits to be derived from such examinations. These factors, along with the cost of such examinations, often lead to procrastination—and procrastination in cases of carcinoma of the stomach leads only too often to an eventual diagnosis of an inoperable lesion. Our only hope for earlier diagnosis of this disease in the future lies in more frequent examinations, by competent roentgenologists, of the stomachs of patients who present no more than a suspicion of the disease. While this will result in many apparently needless examinations, it will also lead to earlier diagnosis in many cases, and therefore to earlier surgical eradication of the disease. At present it is the only solution to the problem of early diagnosis.

Too much emphasis cannot be placed on the necessity for competent roentgenologic examination, for the earlier the stage of development of the lesion, the more difficult it is to visualize and to interpret it. It seems obvious that incomplete or inadequate roentgenologic studies are practically useless under such circumstances. In addi-

tion, if the examination is negative and the signs and symptoms which have aroused suspicion persist, the examination should be repeated after an interval of a few weeks.

In conclusion let me emphasize that in our attempt as practitioners to recognize carcinoma of the stomach in its earlier stages, we must depend principally on signs and symptoms which lead only to a suspicion of the presence of the disease. Our suspicions should be aroused by any patient of middle age or beyond who has indigestion which persists for two weeks or more, by any patient who in addition to his usual chronic dyspepsia has an acute exacerbation or change in digestive symptoms, or by any patient who suffers from anemia, fatigue, a decline in health, weight or strength, or who bleeds from the intestinal tract—all without adequate explanation. We must continually be conscious of this disease as we scan the diagnostic horizon of the patient who sits before us. If our suspicions are aroused, then we must *insist* on competent roentgenologic study of the stomach.

THE TREATMENT OF TRICHOMONAS VAGINITIS WITH SILVER PICRATE*

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WHILE vaginitis caused by Trichomonas vaginalis has been controlled by several methods of treatment reported by other authors, most of these methods are not well adapted to the particular problem with which we are confronted in this clinic. Patients living in dormitories and engaged in college work find it impossible either to make use of douches or to spare the time required for the frequent clinic attendance which some methods of treatment require. From the standpoint of our staff, also, any method of treatment which reduces the number of visits to the clinic is advantageous.

Twenty patients, including twelve University students, have been treated with silver picrate by the method described here, which has proved very satisfactory from the standpoint of simplicity, efficiency, and economy of time and money. While we do not feel that silver picrate is any more specific for Trichomonas than other drugs, there is controlled evidence of its toxicity in low concentration for this group of organisms,[8] and in our hands the clinical application appears to confirm the laboratory evidence. The fact that a comparatively short course of treatment, usually two weeks, has produced remission of symptoms and negative smears for the five to six months' observation period appears to us to warrant this report of our investigation.

Donne[2] first called attention to this parasite in 1836, and in the years following it was considered to be a simple ciliated cell. In 1855 Kölliker and Scanzoni[6] established positive diagnosis of the disease, described the symptoms as we recognize them today and used diluted vaginal secretion for direct microscopic examination. Excellent reviews of the literature on Trichomonas vaginalis are those of Bland, Goldstein and Wenrich, and of Jacoby and DerBrucke, which also illustrate the present difference in opinion as to the pathogenicity[1] or non-pathogenicity[4] of the organism. However, regardless of this point, most writers favor retaining the term "Trichomonas vaginalis vaginitis" as a description of a definite entity, directing their treatment toward the elimination of the parasite, and in the past five years the infestation has attracted much attention.

The most outstanding symptom of Trichomonas vaginitis is pruritus. The patient complains of a constant vaginal discharge which is pale yellowish-green, sometimes so profuse that a pad must be worn continuously. The discharge is very irritating and produces a diffuse mottling and redness about the introitus, at times with ulceration of the vulva and redness of the adjacent surfaces of the thigh. This leads to itching and burning which interferes with the patient's sleep as well as her work. Pelvic pain

*From the Student Health Service, University of Minnesota, Minneapolis.

and even abdominal pain may be present. The vagina is red and inflamed and very tender. Usually small hemorrhagic spots may be seen. Diagnosis is made by the above symptoms and by finding the organism in a fresh smear, either by the hanging drop method or by placing a drop of normal saline, mixed with the secretion from the vagina, on a slide and covering it with a cover glass, using a little pressure. This Trichomonad has four flagella, with its undulating membrane attached at a point about half way down the body. The movements of the flagella and undulating membrane make identification very simple. The flagellates are harbored in the rugæ of the inflamed and thickened vaginal mucosa and their growth is stimulated by fresh blood, which explains the recurrence of symptoms following a menstrual period. A smear should be taken to exclude gonorrhea.

Many methods of treatment have been used for this condition with variable results, indicating that nothing specific has been found. The patient gets at least temporary relief with almost any of the popular forms of treatment,[3,5,7] but most of them require daily office visits by the patient over several weeks' time or else daily douches at home. Many of the college students I have treated were unable to take douches because of their living conditions. Most of these are young girls and virgins.

Method of Treatment

The vagina is cleansed with hydrogen peroxide solution, which readily removes the discharge and is non-irritating. The mucosa is then dried and entirely covered with a 1 per cent dispersion of silver picrate in kaolin.* The patient is then directed to insert for six nights a boroglyceride-gelatin suppository containing two grains silver picrate, and then to return for the second insufflation. This is in turn followed by the use of six more suppositories. This constitutes the "routine treatment" referred to in the case histories.

Patients have been re-examined for five or six months and have remained symptom-free. While in most of these cases the preliminary cleansing was carried out, there is some evidence that results are just as satisfactory if this is omitted. In two virgins, it was impossible to insert even a virginal speculum because of the small opening and the marked irritation. In these the vagina was swabbed out with hydrogen peroxide, using an applicator, and this was followed by the insufflation of the powder. These two patients cleared up rapidly, but they were both acute and of short duration.

In the majority of cases no Trichomonads could be found and the patient was symptom-free after the first treatment. The smears were again checked in a week, and also immediately following menstruation. If the patient started menstruating during her treatment no change was made in the method of procedure. In cases where any discharge persisted, even if the smears were negative and the patient was otherwise symptom-free, five grams of the picrate powder was again insufflated. As will be noted in the case histories below, satisfactory relief of symptoms and control of the infestation was obtained in all cases.

Case 1.—Miss A. B., aged twenty-one.

History.—Slight leukorrhea since onset of catamenia, seven years ago. Discharge profuse, with pruritus, one week before present examination.

Examination.—Irritation of vaginal wall, associated with profuse discharge. Hanging drop positive for Trichomonas vaginalis.

Treatment.—February 4, 1936. Routine as outlined above. Symptoms disappeared. Following next menstruation there was a slight amount of discharge, which was negative for T. vaginalis. One insufflation was given at this time. One week later there were no symptoms nor discharge. There was no discharge following the next menstrual period and no symptoms have appeared since. Under observation four months.

Case 2.—Miss A. B., aged forty-two.

History.—Supravaginal hysterectomy, January 3, 1936.

Examination.—March 10, 1936. Profuse discharge. Severe pruritus and chafing. Congested and irritated vaginal wall, and profuse discharge which was positive for T. vaginalis.

Treatment.—March 10, 1936, routine. March 17, no symptoms. Negative for T. vaginalis. March 24, patient comfortable but some discharge present. One insufflation given at this time. March 31, smears negative. Vaginal wall appeared normal. April 6, patient in for check-up. April 13, patient in for check-up. April 20, patient in for check-up. May 5, no symptoms.

Case 3.—Mrs. F. B., aged thirty-three.

History.—Two normal pregnancies, five and seven years ago. Discharge with severe pruritus but no chafing, for one month.

Treatment.—January 28, 1936, smears positive. Routine. February 4, smears negative; February 11, after

*For this purpose the Shelanski insufflator has proved the most satisfactory instrument, due to its ballooning effect and simplicity of operation. The insufflator and powder used was supplied through the courtesy of John Wyeth & Brother, Inc., Philadelphia.

menstruation slight discharge with pruritus. One insufflation given. February 18, patient in for check-up. No symptoms. February 25, patient in for check-up. No treatment. Since March 12 smears negative but slight itching at times. Vagina appears normal and discharge very slight. Patient used suppositories during March menstrual period. Has had no symptoms since. Last examined May 5.

Case 4.—Miss C. C., aged twenty-two.

History.—Treated elsewhere two years ago. Says she was given "local treatment," some discharge at intervals with itching.

Examination.—Negative, except slight discharge.

Treatment.—February 11, 1936, vagina cleansed with peroxide solution but no powder used. February 18, after menstruation moderate discharge positive for Trichomonas vaginalis. Routine treatment. February 25, negative for T. vaginalis. March 17, slight discharge, negative for T. vaginalis. Five grams powder insufflated. March 24, smears and symptoms negative. April 14, slight discharge. Negative hanging drop. Five grams powder used. To return for check-up. June 6, returned for recheck before school closed. No symptoms, negative findings.

Case 5.—Miss R. H., aged nineteen.

History.—Discharge and slight chafing for two months.

Examination.—December 5, 1935. At completion of menstruation some pruritus present. Hanging drop positive.

Treatment.—December 5, 1935, routine. December 12, smears negative. January 4, 1936, after menstruation, negative for T. vaginalis. February 1, after menstruation, negative for T. vaginalis. March 12, slight irritation. Moderate discharge but no T. vaginalis could be found. One insufflation given. April 2, negative. May 5, negative.

Case 6.—Miss G. M., aged twenty.

History.—Has been undergoing treatment for two years for severe pruritus and chafing. Relieved only by daily douches of green soap.

Examination.—Smears positive for T. vaginalis.

Treatment.—March 24, 1936, routine treatment March 31, smears negative. April 20, had discomfort during menstruation, and used her usual douche on her own initiative. April 25, menstruation completed. Slight bloody discharge from cervix. Smear negative. Additional 5 grams of powder given as prophylactic, and suppositories directed. May 2, negative. June 6, negative. Patient advised to use suppositories if any symptoms during vacation, to be spent at summer camp.

Case 7.—Miss M. P., aged twenty-two.

History.—Patient seen in November, 1934, when profuse discharge from vagina was found to be positive for T. vaginalis. Treated at that time with sodium perborate irrigations and quinine insufflations. Quinine treatment daily for ten days produced negative smears, and there was very little discharge following menstruation, but during December, 1934, symptoms again appeared and treatment was repeated. During 1935 symptoms were controlled by silver picrate suppositories.

Examination.—Seen again November 9, 1935, with profuse discharge, positive for T. vaginalis. Routine treatment given. Patient has had no positive smears but there is a moderate amount of irritating discharge. Suppositories of silver picrate are used to control this and the discharge is gradually decreasing. Last seen May 2, 1936, and had used only two suppositories during the preceding month.

Case 8.—Miss I. P., aged twenty.

History.—Discharge and irritation for three days since last menstrual period. Hanging drop positive November 23, 1935.

Treatment.—Routine, starting November 23, 1935. No symptoms after next three menstrual periods.

Case 9. Miss E. S., aged nineteen.

History.—Pruritus and chafing for one week.

Examination.—Moderate discharge, positive for T. vaginalis.

Treatment.—Routine, February 6, 1936. Negative after March and April menstruation. Returned for check-up June 6, 1936. No symptoms. Examination negative.

Case 10.—Miss M. T., aged twenty-four.

History.—Slight irritation following two menstrual periods.

Examination.—Moderate discharge, positive for T. vaginalis March 14, 1936.

Treatment.—Routine, March 14, 1936. No symptoms since. In for check-up June 6, 1936. No symptoms, examination negative.

Case 11.—Miss R. T., aged twenty-one.

History.—Treatment over two years for recurrent leukorrhea. Severe pruritus and chafing for one month prior to present examination.

Examination.—Irritation of vulva, profuse discharge, positive for T. vaginalis.

Treatment.—December 6, 1935, Quinine sulphate insufflation. Results good. January 6, 1936, symptoms returned. Routine treatment with silver picrate powder. March 21, symptom-free until after March menstruation, when slight discharge appeared, which was negative for T. vaginalis. Five grams silver picrate kaolin powder given. April 18, after menstruation, no discharge or symptoms. May 15, examination negative. No symptoms.

Case 12.—Miss I. L., aged twenty-two.

History.—Profuse discharge and pruritus for one week.

Examination.—Virginal hymen. Swelling of vulva and profuse vaginal discharge, positive for T. vaginalis.

Treatment.—March 14, 1936, routine without using speculum. March 21, very little irritation. Negative hanging drop. March 28, smears negative for T. vaginalis. Very little discharge and irritation. April 4, after

menstruation discharge moderate, negative for Trichomonas. One insufflation of powder given. April 11, slight increase in discharge and pruritus, positive for T. vaginalis. Routine treatment. April 18, negative. April 25, negative. May 1, after menstruation, no symptoms. Examination negative.

Case 13.—Mrs. J. D., aged twenty-three.

History.—November 15, 1933, pregnant six months. Profuse discharge, irritation and pruritus. Positive for T. vaginalis. Scrubbed with green soap, dried and dusted with powder (quinine). Delivered February 7, 1934, baby had thrush. May 11, 1935, pregnant six weeks. Pruritus and moderate discharge. Positive for T. vaginalis. Treated with kaomagma and picric acid crystals. T. vaginalis absent but some pruritus, so weekly treatments were given up to six months of pregnancy. Zinc oxide ointment with 1 per cent phenol was then used for pruritus. Very little discharge. No Trichomonas found during seventh month. Patient delivered January 21, 1936.

Examination.—March 3, 1936, moderate discharge and severe pruritus, positive for T. vaginalis.

Treatment.—March 3, 1936, routine. May 5, no symptoms since March treatment.

Case 14.—Miss M. S., aged twenty-five.

History.—Pruritus since last menstrual period.

Examination.—November 14, 1935, profuse discharge, positive for T. vaginalis.

Treatment.—Routine, November 14, 1935. symptoms rapidly disappeared. After December menstruation, slight irritation and discharge. Routine, which controlled symptoms and discharge. After January menstruation, no symptoms, but slight discharge. Five grams silver picrate used. After February, March, and April menstruations, no symptoms or discharge.

Case 15.—Miss A. A., aged thirty.

History.—Under treatment for three years. Comfortable while under treatment with green soap and quinine, but could not afford to continue.

Examination.—Slight irritation of vagina, with moderate discharge, positive for T. vaginalis.

Treatment.—November 9, 1935, routine. November 23, patient reported this was first week in three years she was comfortable without use of douches. Some slight symptoms remained. Smear and hanging drop negative. Vagina scrubbed with glycerin, green soap and mercury bichloride. November 25, slight discharge. Hanging drop negative. Treated with 5 grams silver picrate-kaolin. December 1, beginning of menstruation, slight irritation. One suppository nightly kept patient comfortable. December 7 to December 14, vaginal tract negative for T. vaginalis. December 14 to December 21, no discharge but some irritation. Examination negative. Checked after January menstruation and used one suppository nightly. Has had no symptoms since. June 6, 1936, examination negative.

Case 16.—Miss A. R., aged twenty-nine.

History.—Pain in right lower quadrant with irritative discharge two years ago. Appendix and right ovary removed. No improvement, so dilatation and curettage was performed. Green soap douches ordered. Discharge has continued, necessitating continual use of napkin, but no irritation as long as douches were continued.

Examination.—Patient referred to me. Typical discharge. Positive for T. vaginalis (January 13, 1936).

Treatment.—January 13, 1936, routine. January 20, no symptoms. Instructed to omit douches. January 25, slight discharge, but no irritation. Five grams powder given. Hanging drop negative. February 5, menstruation. No symptoms, but slight discharge. Hanging drop negative. Five grams powder used. February 12, examination negative. March 5, post-menstruation, no symptoms or discharge. April 5, no symptoms or discharge. Checked, no recurrence.

Case 17.—Mrs. K. D., aged twenty-six.

History.—Pruritus for six months. Treated in another city. January 9, 1935, tincture green soap, glycerin and bicarbonate pack. Green soap douches at home, which controlled symptoms as long as used.

Examination.—Second degree retroversion. No symptoms. Moderate discharge, positive for T. vaginalis.

Treatment.—January 21, 1936, moderate discharge, positive for T. vaginalis. Routine. February 21, no symptoms, occasional slight discharge. No treatment. April 21, used suppositories during menstruation. Examination in June was negative, and patient was free of symptoms.

Case 18.—Miss G. G., aged eighteen.

History.—Irritating discharge for one year. Lysol douches used. Examination positive for T. vaginalis. Treated with devegan after green soap cleansing. Symptoms improved. Examination after menstruation showed moderate discharge and negative hanging drop, after using one devegen tablet each night. November 4, 1935, patient reported that as soon as she stopped using the tablets her symptoms returned.

Examination.—November 14, 1935, profuse discharge, positive for T. vaginalis. Routine treatment. November 21, slight discharge. December 14, slight discharge. Negative hanging drop. Five grams silver picrate-kaolin used. No symptoms after February, March, April, May and June menstruations.

Case 19.—Mrs. C. V., aged thirty-seven.

History.—Admitted for sterility study. On November 19, 1935, appeared with a profuse, irritating discharge which started two days previously, following coitus.

Examination.—Profuse discharge, positive for T. vaginalis.

Treatment.—Routine. No symptoms thereafter. Patient had spontaneous abortion April 14. Last seen July 8, 1936. No recurrence of Trichomonas.

Case 20.—Miss M. P.

History.—Discharge for last three months, with chafing.

Examination.—Profuse discharge, positive for T. vaginalis.

Treatment.—December 15, 1935, routine. January 15, 1936, after menstruation, moderate discharge, slight chafing. Trichomonas positive. Routine. January 22, smear negative. January 29, slight discharge, hanging drop negative. Five grams silver picrate-kaolin used. February 27, no symptoms. Negative examination. May 2, no symptoms. June 4, negative.

Summary

1. A method of treatment of T. vaginalis vaginitis is described, using insufflations of silver picrate and kaolin in conjunction with suppositories of silver picrate.

2. The average period of treatment is two weeks.

3. This small group of cases is submitted because of the uniformity of relief the silver picrate treatment gave each patient. It is not claimed that silver picrate is specific for Trichomonas vaginitis.

4. Case histories are given on twenty patients who received this treatment. The cases reported were all symptomatically severe. Twelve of the patients were students at the University of Minnesota and were unable to take douches because of their living conditions. Three patients had been treated over a period of more than two years, but their symptoms increased in severity as soon as a daily douche was neglected, previous to the present treatment.

5. All of these patients have been examined over a period of five or six months following treatment and there have been no recurrences. As a precaution against recurrence one insufflation of the powder was used if any discharge persisted.

6. The efficiency of this treatment in the so-called "intractable cases" with the attendant disappearance of the discomfort and discharge causes a marked improvement in the mental status of the patient.

7. The silver picrate treatment as described above is successful, inexpensive, and simple. The patient can dispense with douches. Office visits can be safely limited to one a week for two or three weeks. The patient should return after her menstrual period for a re-check.

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Injection Treatment of Hernia

In March, 1936, the Council on Pharmacy and Chemistry of the American Medical Association addressed a questionnaire to a selected list of hospitals, with a view to obtaining data on the injection treatment of hernia. Replies, which were received from most of the institutions addressed, indicated that the method is not used in the majority of the hospitals consulted and that it is considered safe and effective by those using it, although many qualified their opinions as to safety and effectiveness by specifying careful selection of cases. Several unfavorable complications were recorded. The solutions used by various observers included sodium morrhuate; a mixture of phenol, alcohol and oil of thuja; and several mixtures containing tannic acid or tannic acid derivatives. In some of the institutions, preparations of proprietary character, such as the Pina-Mestre solution, Galtanol and Prolif-erol, were used. Subsequent to the issuance of the questionnaire by the Council, a letter was addressed to *The Journal of the American Medical Association* by some fifty physicians in good standing who have been using the injection method, citing their opposition to some of the criticisms contained in the questionnaire. It is their opinion that the method will develop greater usefulness as it is more definitely understood, as the solutions used are more capably investigated and standardized, and as the limitations and uses of the method are more completely worked out. With this point of view the Council on Pharmacy and Chemistry is inclined to agree. Nevertheless, the following considerations should be borne in mind not only by those expert in the injection method but also by the medical profession in general: The attempted cure of hernia by the application of the method of adhesive inflammation is not new. The method has, however, failed to establish itself as a routine method for the treatment of hernia and is still in an early experimental stage. In view of these facts, surgeons who practice this method should realize the dangers from an ethical, a legal and a financial point of view. Those who continue to experiment with the injection method for the treatment of hernia with a view to standardizing this method will do well to use only such mixtures as may be prepared under their own direction in the laboratory of the hospital with which they may be associated, or mixtures prepared by competent pharmacists according to prescriptions prepared by the physician himself. (J. A. M. A., September 26, 1936, p. 1052.)

CASE REPORTS

DOUBLE APPENDIX

Associated with Agenesis of the Bladder and Other Congenital Anomalies

C. W. DEL PLAINE, M.D.

Minneapolis

THE following case is presented because it shows two unusual anomalies in addition to others which are found more frequently.

The protocol of the autopsy made by the Department of Pathology, University of Minnesota, is given below.

Clinical Data.—The mother, Mrs. ——, twenty-two years old, gravida 1, para 1, had her last menstrual period March 17, 1935; the date of expected confinement was December 22, 1935. There were no abnormalities during this pregnancy. She made regular visits to the doctor. Blood Wassermann and Kahn reactions were negative. She was admitted to the hospital December 29. Delivery was at 11:30 p. m., December 29; OLA presentation. There were no complications. Hemoglobin was 74 per cent; urine examination showed a slight trace of albumin and a slight trace of sugar. Microscopic examinations were negative.

The condition of the baby at birth was good except for a malformation of the anterior abdominal wall. Birth weight was 5 lbs., 1 oz. The cord measured 19 cm. and appeared to be frayed off. The placenta was normal and measured 17 x 18 cm. and weighed 453 grams. There was a marked amount of granular yellow vernix caseosa. The baby was doing well until the second day of life, when jaundice suddenly appeared. Meconium was seen coming from one of the openings in the defect on the abdominal wall. A catheter was inserted into one of these openings, but resistance was met and it could not be passed any length. No urine was seen coming from any part of the anterior abdominal wall. The infant died at 11:25 p. m., January 22, 1936.

The body was that of a well developed, fairly well nourished white baby girl weighing 2,0000 grams, measuring 32 cm. crown rump and 47.5 cm. crown heel. There was slight rigor, moderate hypostasis, no edema, slight cyanosis of finger tips and lips and a generalized jaundice. The pupils were equal and measured 3 mm. There were no notable congenital abnormalities about the head and thorax. The cord was tied, but the umbilicus was found in a defect of the anterior abdominal wall, which was located in the region of the symphysis pubis. This defect of the anterior abdominal wall measured 4.5 cm. in width and 5 cm. in length. There was no anus to be seen. There was no skin over this defect in the wall. It was composed of a fleshy mass which had several openings. There was no evidence of any external genital organs.

The peritoneal cavity had smooth and glistening walls. The diaphragm arched to the fourth rib on each side. The intestines were distended with gas. The appendix was not seen or found at preliminary examination. The liver extended 2.5 cm. in the right costal margin and 2.5 cm. at the xiphoid process.

The pleural cavities and pericardial sac were free from fluid and adhesions. The thorax measured 8 cm. at the level of the fifth rib; the heart occupied 3.5 cm. of this space.

The heart weighed twelve grams. The foramen ovale and ductus arteriosus were patent. The valves, endocardium and myocardium appeared normal. The aorta and coronary arteries appeared normal.

The right lung weighed 26 grams; the left 21.5 grams. The usual lobes were found. The lungs were well aerated. No hemorrhages were seen. The bronchi showed no obstruction.

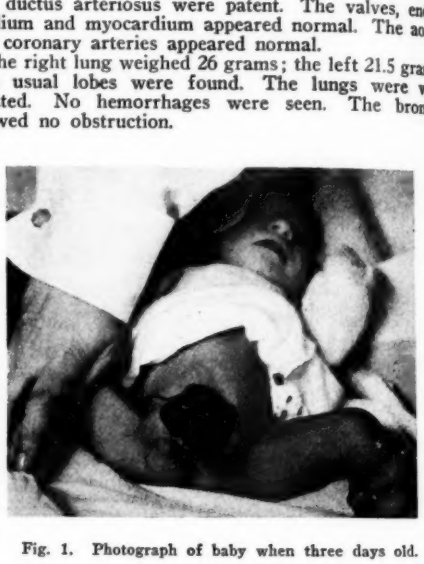

Fig. 1. Photograph of baby when three days old.

The spleen weighed 5 grams. It was dark red in color and appeared normal when selections were made.

The liver weighed 87 grams. The edges were rounded. The color was dark red. On section nothing remarkable was seen. The gallbladder was filled with bile which could be easily expressed into the common duct into the duodenum.

The esophagus, stomach, and duodenum were normal. The stomach contained a small amount of white curded material. There was no obstruction from the duodenum to the terminal part of the ileum which was found in the region of the herniation of the abdominal wall. At various points throughout the small intestine bile stained fecal material was seen. The small intestine measured 138 cm. in length. There appeared to be an opening for the small intestine on the anterior surface of this defect. There appeared to be a common cavity into which the small intestine and the large intestine emptied. The large intestine measured 8 cm. and terminated in a blind projection from this common junction. [At the tenth fetal month the average normal length of the large intestine is 64.5 cm.; the average normal length of the small intestine is 301.5 cm. At birth the average normal length of the large intestine is 66.0; the average normal length of the small intestine is 338.5 cm.][18] At the junction of the ileum and the cecum there were two appendages which appeared to be appendices. The appendage on the right measured 2 cm. and the one on the left of the cecum measured 1.8 cm. In this remnant of the colon there were white contents in the lumen. The small intestine was found anterior to the cecum. The opening of the

small intestine through to the outside was found in the midline and upper area of this wall defect. There was a smaller similar opening, which was found to the left and about 1 cm. below the small intestine opening, which lead into the blind end of the colon. There was no great omentum found and there were thin adhesions between the stomach and the small intestine. The pancreas weighed 1 gram and was found in its usual position; section appeared normal. The right adrenal weighed 2 grams, the left 2.5 grams. Section appeared normal.

The right kidney weighed 10 grams, the left 9.5 grams. The capsules stripped with ease. The usual fetal lobulations were seen. On section the normal relation of cortex to medulla was seen. The pelves appeared normal. Neither ureter was distended and both appeared normal in shape. The right ureter terminated in an opening into the right vaginal cavity. It curved upward and around the right side of the uterus. The left ureter pursued the normal course but emptied into an opening to the outside in this defect of the abdominal wall. It also curved posterior and to the left of the left uterus. There was no organ which could be found that resembled the bladder. There were two separate sex organs, one on either side of the pelvis. The right side contained a tube, an ovary, a uterus, a cervix and a vagina. The vagina appeared long and the cervix was not plainly seen. The uterine cavity was large and the uterine wall was thin. The sex organ on the left contained a well formed ovary, a tube, and a solid organ which was considered probably to be a uterus. There was no cervix found. The cavity into which the left ureter opened might be a vagina. There was a very small opening from this cavity to the outer wall of the abdominal defect. There was a larger genito-urinary opening on the right side and this led into the vagina. There was no evidence of labia found.

The aorta was normal. There was no lymphadenopathy.

There was no hemorrhage in the ventricles of the brain. There were no hemorrhages or tears of tentorium or falx.

The epiphyseal lines of femur and tibia appeared normal.

The skeletal system showed no defects.

The umbilical cord contained two arteries and one vein.

Microscopic Examination: Sections of liver, spleen, pancreas, adrenal and kidney appeared normal.

Diagnoses: 1. Multiple congenital anomalies: (a) Defect of anterior abdominal wall; (b) Agenesis of bladder; (c) Double uterus and double vagina; (d) Malformation of colon; (e) Double appendix; (f) Agenesis of great omentum; (g) Agenesis of external genital organs. 2. Jaundice.

A search of the literature shows only eight reported cases of double appendix. Of these, six appear to be cases of true congenital malformations. They are briefly summarized below. Emrys-Roberts and Paterson,[6] in 1906, reported rather casually a still-born full-time fetus in which "on each side of the junction of the small intestine with the cecal pouch is a small sacculated and curved appendix."

The following year Schooler[19] reported operating on a woman twenty-three years old who had one normal and one gangrenous appendix.

In 1911, Young[21] reported an appendectomy in which one appendix contained pus, and the other was ruptured. These measured 3 inches and 3.5 inches in length, each having a meso-appendix.

Berthold,[1] in 1932, reported operating on a sixty year old woman for strangulation ileus. Two appendices were found, one 7 cm. long in the normal site, the other 5 cm. long, 2 to 3 cm. laterally, growing from the haustrum.

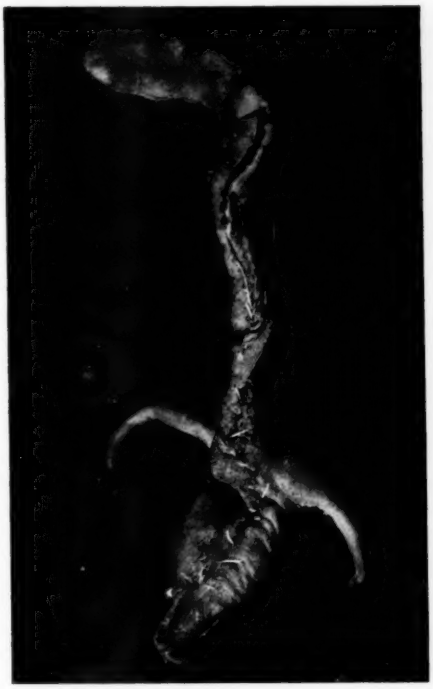

Fig. 2. Two appendices.

Pratt,[13] in 1933, reported a case of two appendices which he believed to be the homologues of avian ceca rather than true appendices. He pointed out that, "There is no point in the formation of the human appendix where doubling might logically be expected to take place."

Clavel and Closon,[3] in 1933, found at operation, in a woman thirty years old, two appendices about 1 cm. apart, but with a single meso-appendix between them. They were enclosed in a common serosa and were supplied by a single appendicular artery.

These cases are quoted here in answer to the rather sweeping statement of Kelly and Hurdon,[11] "In regard to misplaced and supernumerary appendices, most of these can be accounted for on other grounds. In a number of cases appendices have been reported as arising from the ileum, at various distances from the ileo-cecal valve. Without wishing to criticize these statements it seems more probable that these authors have seen and described Meckel's diverticulum, i.e., the remains of the vitelline duct of the embryo. It is also possible that one of the epiploic appendages which are found at intervals along the intestine may have been mistaken at times for an atrophic appendix."

A brief summary of the embryology of the human intestine may be of interest. In 5 mm. embryos there are two limbs of the intestinal loop, the cephalic and the caudal, connected ventrally with the yolk stalk. Caudally the intestinal tube expands to form the cloaca.

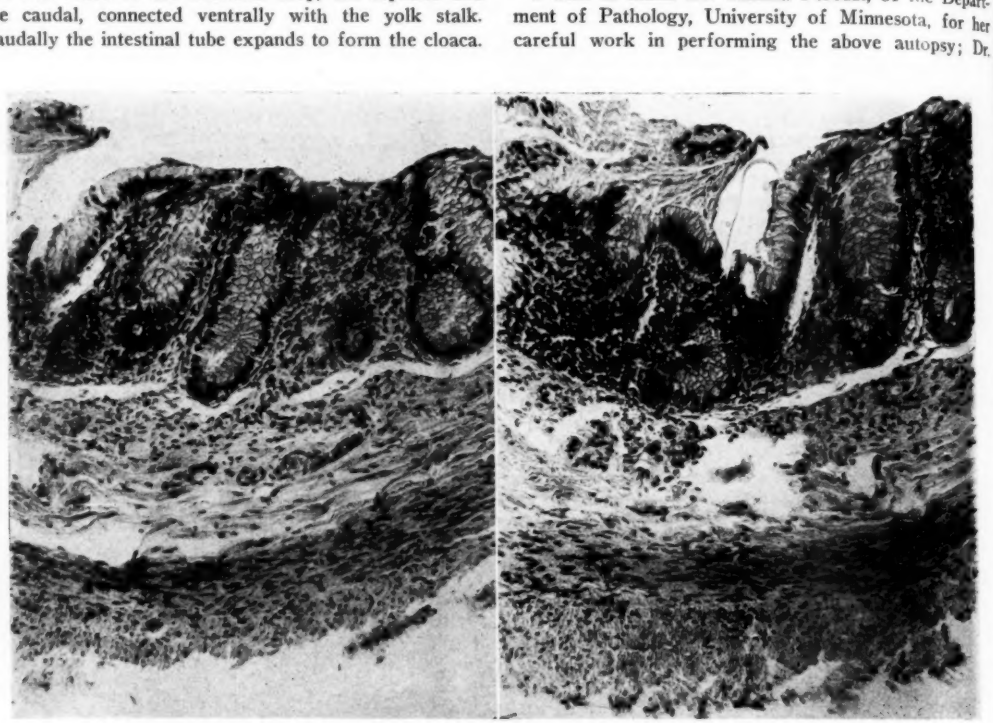

Fig. 3. Microscopic section through the wall of each appendix.

Before the 9 mm. stage is reached, the attachment to the yolk stalk normally disappears. Also in the caudal limb of the intestinal loop there is formed an enlargement, due to a ventral bulging of the gut wall, that marks the anlage of the cecum and the boundary line between the large and small intestine. At the 17 mm. stage the distal end of the cecal anlage begins to lag in development, forming the future vermiform appendix, which by the 65 mm. stage is distinct from the cecum.

So the appendix can be regarded as an undeveloped cecum.

The comparative anatomy of the appendix is interesting. The true appendix is found only in man and the anthropoid apes. The little ant-eater is the only mammal to have two short cecal pouches that are well defined processes. Herbivorous birds have two long cecal pouches, which can readily be seen in domestic fowls.

As Pratt[13] states, however, "The bird is a distinct relative not an ancestor of man, so that the human embryo does not pass through an avian stage in the process of development."

In regard to the absence of the urinary bladder, one can say little except that it is one of the rarest of anomalies of the urogenital cases. Those few cases found reported in literature are listed in the bibliography below.

I wish to thank Dr. Thelma Perozzi, of the Department of Pathology, University of Minnesota, for her careful work in performing the above autopsy; Dr. E. T. Bell, Head of the Department of Pathology, University of Minnesota, for his suggestions and cooperation in obtaining photographs of the sections of the appendices; and Dr. Richard E. Scammon, Distinguished Service Professor in the Graduate School, University of Minnesota, for his kind suggestions and criticism.

Conclusions

1. Double appendix in the human being is rare.
2. Enough cases have been reported so that surgeons should bear in mind such a possibility when performing an appendectomy.

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MUCOCELE OF THE APPENDIX

O. E. SARFF, M.D.

Virginia, Minnesota

E. M., a schoolgirl eighteen years of age, was admitted to the hospital June 8, 1936, at nine p. m. She was complaining of nausea, vomiting and crampy pains in the right lower quadrant, which dated back to four p. m. of June 7, a total of twenty-nine hours.

The patient had had no previous serious illness but during the past year had had several attacks of vague lower abdominal distress at no time severe enough to consult a physician.

The present attack subsided the morning of June 8 but recurred at three p. m. of the same day with increasing violence.

The patient, when seen, had a leukocyte count of 17,900, pulse rate 88, temperature 99.4 and normal urine. There was no distention of the abdomen, no palpable mass, but there was exquisite tenderness over McBurney's point, rebound tenderness and grade I muscle spasm.

Pelvic examination revealed no mass but considerable tenderness was demonstrated in the region of the right uterine adnexa.

The abdomen, which was opened under ether anesthesia through a right rectus incision, contained a small amount of free serous fluid.

A tumor mass was felt which was bound down in its entirety to the cecum and when visualized was found to be covered with a so-called "Jackson's veil." The tumor was removed without difficulty and the raw surfaces were peritonealized.

The closure was without drainage, convalescence was without incident and the patient was discharged on the ninth day.

Pathologic Report

Macroscopic.—This is an appendix, preserved in formalin, measuring 11.0 cm. in length and up to 4.2 cm. in diameter. The serosa is quite congested. The lumen is very much distended, filled with masses of coagulated mucous material.

Microscopic.—The mucosa of the appendix is atrophic. The epithelial lining is extensively desquamated. The submucosa is thin and infiltrated with lymphocytes. The muscular layers are thinned out by the distention. The serosa is infiltrated in places with a few lymphocytes. No tubercles can be demonstrated in the examined sections.

Diagnosis.—Mucocele of the appendix. The accompanying photograph is an enlargement to the actual size.

Photograph (actual size).

SIAMESE TWINS*

Report of Delivery and Successful Operation

HILLARD H. HOLM, M.D.

Glencoe, Minnesota

THERE are several facts concerning the delivery of the babies described in this report which make the case especially interesting. The twins were born during a raging blizzard on January 8, 1927, in a farm home approximately fifteen miles from town. I was called to attend the case.

The mother was a primipara. Labor had gone along normally for about eighteen hours. Previous examination of the abdomen had revealed that undoubtedly twins were to be born, as two separate fetal heart tones could be heard, although the parts could not be definitely determined. At the end of nineteen hours of labor the head of one child was delivered normally, the occiput anterior. On attempting to deliver the shoulders they were found to remain stationary and could not be delivered. It was a baffling situation. After studying the situation carefully I passed my right hand up into the vagina, up alongside the abdomen of the child to be born, and felt two feet. These I grasped and exerting traction on them, at the same time pulled with my left hand on the shoulder of the child being born. Immediately the shoulders slipped out, and along came the feet of the second child as well as the buttocks and the abdomen. The buttocks and feet of the first child were then delivered free of the vagina and a connection was noticed between the twins. The head of the second child was then delivered, as in a breech extraction. One umbilical cord was present, attached at the under surface of the union of the two babies. After the cord had been clamped and tied and dressed it was noticed that the pouch connecting the two children was twisted. The infants were then rotated so that they were face to face, which apparently untwisted the pouch connecting them. It was a strange sight to behold, and I must admit that Dame Fortune was with me because if the two heads had presented at the same time, instead of a head and a foot, the infants could not have been born without a cesarean section.

Both infants were normal in every way except for their being attached together. Their rectal temperatures were each 99.8 degrees, and pulses 125. Each child's heart and lungs were normal in every way. Their abdomens were joined together over an area approximately 4 inches in diameter and 13 inches in circumference. The ensiform cartilages were continuous from one child to the other. One umbilicus was present and entered the lower portion of the attachment. Liver and spleen were not palpable in either child.

Blood examination on February 28 showed a hemoglobin of 76 and 78 per cent and red cells of 4,100,000 and 4,300,000 respectively.

X-ray examination was made and plates were taken.

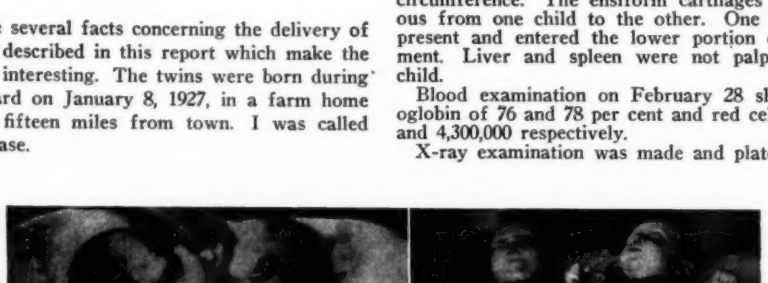

Fig. 1 *(left)*. Siamese twins born January 8, 1927. Photograph taken six weeks after birth.

Fig. 2 *(right)*. Photograph taken two weeks following operation.

One of the children was given a mixture of barium with mother's milk, which it took from the nursing bottle. This was followed up by means of the fluoroscope and it was found that the barium and milk mixture entered into a normal stomach, from which it quickly passed out into the small intestine. The child was spanked and caused to cry, and under the fluoroscope it was seen that the small intestine would push over into the abdominal cavity of the other infant through the pouch, and when the baby stopped its crying the intestine would go back into the proper abdomen. A similar procedure was carried out with the other infant and showed the same condition. X-ray plates were also made. From this examination it could be determined that each child had a separate gastro-intestinal tract and that there was no union of either stomach to stomach, or intestine to intestine.

As Siamese twins could not possibly go through life joined in such a manner and since they had separate organs, it was decided to separate them. Consequently on March 1, 1927, when they were about seven weeks old, operation was undertaken.

The infants were placed on their sides, being the right side of one baby and the left side of the other. A light ether anesthetic was given. With the scalpel an encircling incision was made through the skin around the pouch, midway between the infants and splitting the umbilicus below. Entrance was gained into the pouch through the upper, or nearest, portion. In order to get into the pouch a thin fascia, a small muscular layer and finally the peritoneum, were incised. This was done with extreme care. Moist packs were then inserted to hold back the intestines and the incision carried completely around the pouch through the fascia,

*Read at the annual meeting of the Southern Minnesota Medical Association, Albert Lea, Minnesota, August, 1936. This report was awarded a medal as being the most interesting case report presented at the meeting.

muscle and peritoneum up to the ensiform cartilage, which was continuous from one infant to the other. This was cut with a straight scissors. The falsiform ligaments of the livers of the infants being also united, clamps were applied and they were severed and tied off with plain catgut No. 2. The infants were thus completely separated. Following the separation one of the infants was noticed to become very pale and to stop breathing. The anesthetic was stopped and hypos of adrenalin and camphorated oil, which had been held in readiness, soon brought the infant back to normal condition. It was now necessary to sew up the openings into the abdomens where the pouch had been. This was a difficult procedure and had to be done quickly. One of the infants was tended by a nurse, the anesthestic being stopped on that one. On the other infant the peritoneal covering was then picked up and dissected back. This was sutured in a continuous running locked suture of plain catgut No. 2. Four stay sutures were then placed through the skin, subcutaneous fat, recti fascia and muscle, down to the peritoneum. These were left untied. The recti fascia was then sutured together with No. 2, forty-day chromic catgut in a running locked suture. It was somewhat difficult to draw this together in the midportion, due to the fact that we were making a straight wound out of a round opening. The skin was then sutured with plain catgut No. 2 in a running, continuous suture. The stay sutures were then tied and dressings applied. The other infant was then given a small amount of anesthetic and the suturing of the pouch was done in a like manner. Each infant had a small umbilicus at the lower end of the incision after the operation had been completed.

After the infants had been put to bed they were both given hypodermoclysis of normal saline into each leg, approximately 150 c.c. being given to each baby. Twelve hours postoperative the mother nursed each baby, and they took the breast well. She continued to nurse each infant every four hours during their stay in the hospital. Each infant occasionally had crying spells, which was undoubtedly due to some pain, but otherwise they had a remarkable convalescence, the incisions being completely healed in ten days, at which time the stay sutures were removed.

The infants were seen every month after the operation for an entire year, during which time they were nursed by the mother. At the end of five months solid food such as cereals and mashed vegetables were added to their diet. After the first year they were seen at frequent intervals and were weighed and carefully watched. At the present time they are running about the house, have good appetites, and seem strong, healthy and normal in every way.

HERNIATED EMPYEMA OF GALL-BLADDER OPENED THROUGH SKIN INCISION

ERNEST W. COWERN, M.D.

North Saint Paul

E McG., male, white, sixty-six years of age, was admitted to St. John's Hospital, St. Paul, on January 31, 1936, suffering from chronic Bright's disease with impending uremia. He had had urinary incontinence and some dysuria for several weeks.

The house doctor's admitting note was as follows: "White male, sixty-six, appears somewhat dopey. Faint odor of acetone on breath. Heart negative. Blood pressure 120/80. Abdomen negative. Lungs, numerous crepitant râles on inspiration, left base."

A history obtained by the interne gave the following data: hoarseness for last three weeks; pain in right upper quadrant of abdomen noticed by the patient for a month; cough and expectoration of pus for a month.

Physical examination by the interne gave no important information except that he found tenderness in the right upper quadrant of the abdomen where there was a scar due to a gallbladder operation twenty-one years before. Blood pressure was 120/80. The heart was normal. My examination showed some râles and dullness in the left upper chest posteriorly.

Further history elicited the fact that the man had had both gonorrhea and syphilis some years before.

A catheterized specimen of the urine on the day of admission was cloudy, specific gravity 1.024, acid, no sugar, 2 plus albumen, 2 plus acetone, 3 plus pus, occasional blood cell, 1 plus epithelium, occasional granular casts. The day after admission, the blood urea nitrogen was 56.4 mg. per 100 c.c. of blood.

On the second day, the chest condition was noted as improved and the temperature had fallen to normal. However, the next day, the temperature rose to 100.8, although the patient felt and looked better. Two days later, at my next visit, I noted a return of the chest dullness and, from this time on, the lung condition became gradually worse. On February 7, a week after admission, I noted that the dull area had become larger. The next day, February 8, there were several dull areas, and the patient was placed in isolation because of bronchopneumonia.

Previous to the lung involvement, his general condition had markedly improved, and the involuntaries of both bladder and bowel, which had been present for the first three days, had ceased.

On February 6, two days before he was placed in isolation, he complained of pain under the right costal arch. This was thought to be due to pleural irritation aggravated by coughing, and a wide bandage was applied to restrict movement.

On February 12, I noted the presence of a nodular mass below the right costal arch, sensitive to touch. The next day I wrote: "The mass is larger this A. M., very sensitive to pressure, and causes him much distress. Needling brought a small amount of stringy, yellow material. I made a small incision in the mass and evacuated some bile-stained fluid combined with a glairy, stringy material. I think this is an adherent, herniated hydrops of the gallbladder. The incision gave him much relief." A gauze drain was inserted which was removed the following day. On removing the gauze the pressure in the gallbladder was so great that its contents were ejected for a distance of fourteen inches. At this time there was pus in the discharge and many brown flakes (inspissated bile). A rubber drain was substituted.

The rubber drain was removed daily and the cavity irrigated with saline solution. A light showed the lining of the cavity adherent to the subcutaneous structures. There was a large amount of glairy mucous discharge with many stones, well formed and well faceted. At this time the cavity measured approximately 4.5 cm. in each direction except directly downward.

On February 19 I enlarged my incision to a length of 2.5 cm. The cavity now appeared to be of very irregular depth, in one place being 7 cm. On this day, by irrigation and with a spoon, I removed thirty-three stones of various sizes, the largest being over 1.25 cm. in length and 0.5 cm. wide. There was less drainage, but some pus, together with thick, glairy bile.

The condition improved rapidly so that on February 22 I was getting nothing but clear, golden bile and the use of the tube was discontinued.

On February 21, on account of persistent cough, fever, and much expectoration, an x-ray picture of the chest was taken which revealed extensive, bilateral, advanced tuberculosis, with cavity formation in the left

(Continued on page 758)

CLINICAL PATHOLOGIC SEMINAR*

Conducted by E. T. BELL, M.D.

Department of Pathology, University of Minnesota

Minneapolis

Adherent Pericardium

Case 29.—A boy, nine years old, was admitted to hospital March 14, 1936. In 1931 he had joint pains and fever and was confined to bed for several weeks. Following this the mother noticed that the child grew tired very easily when playing with other children. In 1932 he was brought to the Out-patient Department for tonsillectomy. Routine physical examination disclosed rheumatic mitral heart disease and the child was advised to rest a great deal with modified exercise. In the fall he entered Lymanhurst, where he remained for several months, after which he was transferred to the Dowling School. In the fall of 1934 x-ray of the heart was thought to show a mitral lesion. The child got along fairly well until six days before the present admission, when he developed precordial pain and pain over the left side of the chest which became progressively worse and he was brought into the hospital.

The temperature was 102°; pulse 130; respirations 28; blood pressure 88/70. The heart was markedly enlarged to the left and to the right; systolic and diastolic murmurs were heard over the second left interspace; also systolic and questionable diastolic murmurs over the apex and transmitted to the axilla. The liver was definitely palpable. There was marked tenderness in the mid-epigastrium and there was thought to be some free fluid in the peritoneal cavity.

Urinalysis showed a faint trace of albumin, an occasional pus cell and specific gravity of 1030. The hemoglobin was 62 per cent; red blood cells 4,070,000; leukocytes 8,350 with 50 per cent polymorphonuclears, 42 per cent lymphocytes and 7 per cent monocytes. On two occasions nose and throat cultures showed hemolytic streptococcus. X-ray examination of the heart at this time showed marked enlargement of the cardiac shadow to both left and right with considerable prominence in the region of the pulmonary conus. The contour of the heart was thought to indicate a mitral type of enlargement. The transverse cardiac measurement was 15.2 cm., showing a marked change since the x-ray taken on April 11, 1934, at which time this measurement was 10.1 cm. An electrocardiogram showed prolongation of the auriculoventricular conduction time with high, broad, notched P-waves in all leads. The conclusion was again mitral disease.

The child ran a septic type of temperature, ranging from 100° to 103°. He gradually grew weaker and expired on May 9, after nearly two months of hospital residence.

Postmortem findings: Moderate pitting edema of the ankles; no ascites; 100 c.c. of clear fluid in the right pleural cavity, 50 c.c. in the left. Fibrous pericardium strongly adherent to the posterior surface of the sternum and the costal cartilages anteriorly. The pericardial cavity was completely obliterated by strong fibrous adhesions. All the chambers of the heart were hypertrophied and dilated. There was more hypertrophy of the left ventricle than of the right. The leaflets of the mitral valve were slightly thickened; the chordæ tendineæ slightly shortened; however, there seemed to be little or no insufficiency or stenosis of the valve. There were a few small rheumatic vegetations on the aortic leaflets; these did not interfere with the function of the valve. The tricuspid and pulmonary valves were normal. There was rather marked bronchopneumonia in the right lung. The spleen weighed 90 grams and showed chronic passive congestion. The liver weighed 1,030 grams and showed marked chronic passive congestion. Other organs normal.

Diagnoses: (1) Hypertrophy and dilatation of the heart, due mainly to adherent pericardium; (2) chronic heart failure with general passive congestion; (3) slight scarring of the mitral valve; (4) terminal bronchopneumonia.

Cultures of the blood and spleen, taken at postmortem, were negative.

Comment.—Adherent pericardium is one of the complications of rheumatic fever. In a number of cases of acute rheumatic fever pericarditis develops. In this instance apparently pericarditis developed at the time of the attack of rheumatic fever 5 years before death. The pericardial exudate was organized and the pericardial cavity became obliterated by old fibrous adhesions. Fixation of the heart anteriorly to the sternum is a factor of great importance. The adherent pericardium increases the work of the heart during systole and results in gradual cardiac hypertrophy. The slight thickening of the mitral valve may have contributed to the hypertrophy to some extent in this case.

Carcinoma of the Rectum

Case 30.—The patient, a man seventy-three years old, was first admitted May 20, 1935, with diarrhea consisting of numerous small liquid movements occurring every half to three-quarters of an hour; this symptom had been present for the past four weeks.

On physical examination he was well developed and well nourished; a few rales in the bases of the lungs; blood pressure 180/80. The heart appeared slightly enlarged to the left. Rectal examination showed a large mass on the anterior wall of the rectum in the region of the prostate; it was firm and somewhat nodular; it extended beyond the reach of the examining finger.

Hemoglobin 84 per cent; leukocytes 10,400; 70 per cent polymorphonuclear leukocytes, 27 per cent lymphocytes; 2 per cent monocytes, 1 per cent eosinophils. Urine: Negative to + albumin; occasional granular casts; negative to a few erythrocytes; on several occasions it was loaded with leukocytes. Feces positive for visible and occult blood. The patient had no fever.

Following admission the rectal lesion was diagnosed as inoperable carcinoma. In the meantime the patient developed epididymitis of the right testicle and this was removed; the diagnosis was chronic suppurative epididymitis. The carcinoma was treated by fulguration on two occasions and the patient was discharged August 12, 1935. He obtained relief by this procedure until in February, 1936, when he was readmitted because of constipation; he was now poorly nourished and emaciated. However, the bowel movements became normal without treatment and he was again discharged on February 19 only to be readmitted April 8 because of recurrence of constipation. At this time the mass appeared to be entirely obstructing the rectum and there was considerable pus exuding from the anus. He gradually became weaker and drained small amounts of bloody fecal material from the anus. He became irrational and died at 12:40 P. M., May 5, 1936.

Postmortem findings: Rather marked emaciation;

*Continued from the October, 1936, issue.

no edema; no fluid in the serous cavities. Heart 325 grams; mitral and aortic leaflets showed several large soft vegetations; there was rather marked narrowing and sclerosis of the coronary arteries; there were large scars in the heart muscle. The lower lobe of the right lung was extensively consolidated from a bronchopneumonia. There was a single stone 1.5 cm. in diameter in the gallbladder; the wall of the gallbladder was somewhat thicker than normal. There was a large fungating gelatinous tumor in the rectum which involved its entire circumference and extended downward to within 4 cm. if the anal ring and measured 12 cm. in the long axis of the bowel; it had formed a fistula through the posterior wall of the bladder; a large ulcer was noted in the bladder which communicated with the rectum. No metastases were found even in the pelvic lymph nodes.

Diagnoses: (1) Adenocarcinoma of the rectum with formation of a rectovesical fistula; (2) terminal bronchopneumonia; (3) terminal acute bacterial endocarditis; (4) gangrenous cystitis.

Comment.—The presenting symptom in this case was diarrhea which was probably due to obstruction. Fecal material retained above the obstruction becomes liquefied before it can pass through the narrow opening. This is a fairly typical course of advanced carcinoma of the rectum. The patient was inoperable when first seen. The disease spread into the bladder, as it often does. Even at the time of death there were no metastases so that, if the condition had been recognized early, there might have been a good chance for a cure.

Lymphatic Leukemia

Case 31.—A white girl, sixteen years of age, was admitted April 24, 1936, complaining of nodules in both cheeks and in the skin of the abdomen; she also complained of marked weakness. In August, 1935, she first began to feel tired and dizzy. She was examined by a physician at that time who found hemoglobin 28 per cent. She was put on iron therapy. Several weeks later she developed pneumonia and was confined to bed for about nine days. During this time she was given several transfusions and the hemoglobin rose to 44 per cent. Anemia therapy was continued. In October, 1935, hemoglobin was 96 per cent and she returned to school, as she felt fairly well. In December the hemoglobin had fallen to 68 per cent and anemia therapy was given again. She contracted a severe cold with bronchitis; she vomited a good deal during this attack.

Early in January, 1936, the hemoglobin was found to be 20 per cent and she was taken to a hospital and given several blood transfusions. In March she first noted lumps in the skin of the cheeks and small masses in the skin of the breast and over the abdomen. She was very pale and weak.

Admitted April 24; she appeared markedly anemic; large ulcers of the buccal mucosa; tongue coated; throat injected; several masses were palpable in the maxillary regions; numerous small nodules in the skin of both breasts and in the skin of the abdominal wall. No disease of the heart or lungs demonstrable. Blood pressure 112/62. The abdomen was flat; there was no tenderness; no deep masses; the spleen was palpable. The tumors of the skin of the abdomen varied from 1 to 5 mm. in diameter.

Urine: normal. Blood: hemoglobin 73 per cent; leukocytes 1,900; 100 per cent lymphocytes. A second blood count showed leukocytes 1,200, 100 per cent lymphocytes, 6 per cent of which were immature. Biopsy from one of the tumors in the abdominal wall showed that the tumor was composed of lymphoid cells infiltrating the tissues. Because of absence of granulocytes pentnucleotide was given; liver extract was also administered. There was practically no favorable response.

Just before death the white cells numbered only 390; some immature lymphocytes were found in all the smears. On the day before death a severe ulcerated stomatitis with gangrene developed. Death occurred May 4.

Postmorten examination: No edema; moderate emaciation; no fluid in the peritoneal cavity; 400 c.c. of bloody fluid in the right pleural cavity, 200 c.c. in the left. The heart showed no disease. There was congestion and edema of the left lung and areas of bronchopneumonia in the lower lobe of the right.

The spleen weighed 205 grams and showed abundant pulp. No tumors were noted in any of the organs. Multiple follicular cysts in the right ovary. The marrow of the long bones was deep red in the positions in which it is normally yellow.

Microscopic examination of the liver, spleen and kidneys showed no leukemic infiltration but the bone marrow showed the typical picture of lymphatic leukemia.

Diagnosis: Lymphatic leukemia.

Comment.—It is noteworthy that the patient had leukopenia during the period when she was in hospital. Leukopenia is seen rather frequently in lymphatic leukemia. The evidence of leukemia in the blood smear was the high percentage of lymphocytes and the presence of immature lymphocytes. It is remarkable that there were no leukemic infiltrations in any of the organs except the bone marrow and the skin.

Fat Embolism of the Brain

Case 32.—A white man of sixty-two was admitted May 3 and died May 10. He was walking along the highway when he was struck by an automobile. He did not know the exact time but it was after dark. Immediately following the injury he was unconscious and was taken to a hotel where medical aid was administered. On admission to the hospital he was conscious and able to answer questions intelligently. There was a laceration on the left eyelid and contusions over the left cheek. Pupils equal and regular, reacting equally to light and accommodation. Chest symmetrical; expansion equal on both sides; some tenderness over the lower ribs of the left chest on pressure; lung fields clear to percussion and auscultation; posterior chest hard to examine because of inability to move patient without producing severe pain; no enlargement of heart; sounds and tones of good quality. Abdomen soft; no spasm, rigidity or tenderness. Upper extremities negative. There was marked discoloration in the middle third of both tibias down to the ankles; fracture of right tibia and fibula with fragments lying just beneath the skin and easily felt, but not compound; compound fracture of the left tibia and fibula; laceration in the soft tissues, measuring 2 to 3 cm. in diameter.

X-ray revealed a comminuted fracture in middle third of right tibia with posterior displacement of distal fragment; mediolateral alignment fairly good; several loose fragments about area of fracture; two fractures in fibula, both involving middle third; distal third of fibula displaced medially. Left leg showed an extensively comminuted oblique fracture at the junction of the middle and lower thirds of the tibia with good mediolateral alignment and rather marked posterior displacement of the distal fragment; associated fracture in lower third of left fibula and another at the junction of the middle and upper thirds. There was evidence of a lesion of the soft tissue in the region of the fracture of the tibia. X-ray of the skull was not entirely satisfactory; no definite evidence of fracture; no evidence of gas in soft tissues.

Urine, cloud of albumin, occasional casts, many red and white blood cells. Blood: hemoglobin 72 per cent; white cells 11,000; nonprotein nitrogen 66 mg.; repeated 70.1 mg.

May 4, Kirschner wire was placed in os calcis of both feet in an effort to correct the overriding of the fragments.

May 5, deeply comatose. Neurologic examination showed a positive Hoffmann on the left and right; pupils small, equal and fixed; external strabismus present but slight. Conclusions: fat embolism of brain or cerebral hemorrhage (either subdural, intracerebral or both). Advised trephining to locate hemorrhage and remove clots but patient's condition was so poor that it could not be done. May 8, still comatose; Cheyne-Stokes respiration; findings suggest pneumonia. Death occurred May 10.

Postmortem examination. Fractures were found as described in the clinical record; no blood or excess fluid in the peritoneal cavity; the right pleural cavity contained about 400 c.c. of blood. The heart showed no disease. The right lung weighed 1,450 grams, the left 1,040 grams; massive bronchopneumonia was present. No disease of the liver or spleen. Right kidney absent; left kidney weighed 305 grams; this is an example of unilateral kidney. There was no hemorrhage in the soft tissues of the scalp; no bruising of the brain and no blood in the subarachnoid space; the arteries of the brain showed no disease. On section large numbers of petechial hemorrhages were found throughout the white substance.

Microscopic examination of these hemorrhages showed that the majority were small hemorrhages with a blood vessel in the center, the blood vessel being filled with a fat droplet. The fat was demonstrated by staining frozen sections with sudan iii.

Diagnoses: (1) Fat embolism of the brain; (2) bronchopneumonia; (3) fractures of the bones of the legs; (4) unilateral kidney.

Comment.—Fat embolism is an occasional cause of death after fractures of the large bones. The fat from the ruptured fat cells in the bone marrow enters the veins of the marrow and is carried to the lungs. A great many fat globules pass through the relatively large capillaries of the lungs and lodge in those of the brain. Hemorrhage occurs from the minute vessels around each lodged fat droplet in the brain substance. This gives rise to the petechial hemorrhages that are characteristic. When a patient goes into coma a day or two after sustaining a fracture of a bone, fat embolism of the brain is to be suspected.

"Subenon" for Arthritis and the American Chemical Society

For several years the annual sessions of the American Chemical Society have been accompanied by extraordinary publicity in the lay press concerning new chemical discoveries applicable in the field of medicine and particularly for the treatment of disease. This year, however, even before the opening of the annual session of the American Chemical Society, newspapers throughout the United States carried a story, emanating apparently from the publicity department of the American Chemical Society, indicating that a new specific had been developed for the treatment of rheumatism and arthritis. The item submitted to the press stated that "a compound which curbs arthritis, economically the most devastating of all chronic diseases, was reported by Dr. Herman Seydel (President Seydel Chemical Co., Jersey City, N. J.)." It was said that "the new compound involving the medicinal application of benzoates, has proved effective in clinical tests covering two years at the Jersey City Medical Center." Furthermore, Herman Seydel, Ph.D., reported that "in this calcium double salt of benzyl succinic and benzoic acids we offer the solution of an age-old problem. It remains for the medical profession to adopt it and employ it properly." Thus the speaker to appear before the American Chemical Society put the medical profession of this country squarely "on the spot" with a demand that it use his proprietary remedy. The secret behind this is, of course, the fact that the Seydel Chemical Company is a manufacturing organization which specializes in the manufacture of "benzoic compounds." In his statements "Dr." Seydel mentioned a favorable experience with the treatment at the New York Postgraduate Hospital. The superintendent of that institution, W. B. Talbot, telegraphed protesting reference to the New York Postgraduate Hospital in the newspaper reports of Herman Seydel; that the hospital had used experimentally his product "Subenon" but found it useless in arthritis; and that no favorable reports had been given out from this hospital about Subenon. As the publicity associated with "Dr." Seydel's exploitation of his product came to newspapers with the sponsorship of the American Chemical Society, a well known organization presumed to be composed of scientific men subject to the usual ethics which control scientific workers, press associations and newspapers cannot be condemned if they failed to recognize the definitely commercial background and effect of this item. Neither can thousands of unfortunate sufferers from arthritis be condemned if in response to this item they demand of their physicians that they be given opportunity to test this unestablished drug. The American Chemical Society cannot dodge its responsibility in this case. It is neither within its province nor within its competence to give critical judgment on the treatment of disease. If it wishes to maintain the respect of the medical profession, and the public, the American Chemical Society cannot permit itself to be used as an agent for unestablished proprietary remedies in the exploitation of the sick. (J. A. M. A., September 12, 1936, p. 878.)

EDITORIAL

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BUSINESS MANAGER
J. R. BRUCE, Saint Paul

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Mandelic Acid

THE therapeutic use of organic acids in the treatment of infections of the urinary tract is based on the observation of the bactericidal effect of the urine of patients who received a ketogenic diet. The effective substance produced as a result of a ketogenic diet was shown by Fuller to be beta-oxybutyric acid, which, in a concentration of 0.5 per cent and at a pH of 5.5 causes the death of bacteria. This acid, which is burned when the patient is receiving a normal diet, appears in the urine only when the patient is receiving a high-fat diet.

Rosenheim recently introduced another organic acid, mandelic acid, which can be taken by mouth and which is excreted unchanged in the urine. Mandelic acid corresponds very closely to beta-oxybutyric acid in its bactericidal properties, and its therapeutic use necessitates no dietary regimen. Helmholz and Osterberg showed that at a pH of 5.0 a concentration of 0.25 per cent mandelic acid is bactericidal and that at a pH of 5.5 a concentration of 1.0 per cent mandelic acid is necessary to produce the death of bacteria. The higher the concentration of the acid and the lower the pH, the greater the effectiveness of the drug. Three grams of the ammonium salt, when given to adults four times a day, usually produce a bactericidal urine, procided the output is about 1,000 c.c. If the sodium salt is used, an acid-producing salt, such as ammonium chloride or ammonium nitrate, must also be given to acidify the urine.

As far as is known at present, no harmful effects on the kidneys have resulted from the ketogenic diet. Mandelic acid is not without harmful effects. After its administration, hematuria, albuminuria, and reduced renal function have been noted. Patients with impaired renal function have difficulty in excreting the acid in high concentration, and a urine of low pH. In cases in which there are unilateral renal lesions, there may be marked differences in the ability of the two kidneys to excrete the acid. The infected kidney may be unable to excrete a bactericidal urine and thus no beneficial effect is obtained in spite of the fact that the concentration of acid in the bladder may be within the bactericidal range.

Harper M. Workman

THE inexorable march of time again took its toll in medical ranks when death summoned Dr. Harper M. Workman, long identified with organized medicine in Minnesota.

It was in 1890 that Dr. Workman joined the Minnesota State Medical Association and in 1903, when the most important body of our association, the Council, was first formed, Dr. Workman was elected Councillor of the Fifth District. Except for the year 1917 when he served as president of the State Association, Dr. Workman has been a councillor continuously since 1903, having been president of that body since 1922.

Only those who have been associated with Dr. Workman in the various Association activities in which he has become involved, whether they were the deliberations of the Council, the activities of the Legislative Committee, or the work of the Historical Committee, can appreciate the energy and enthusiasm he manifested for the welfare and interests of medical practice in Minnesota. Many were the times that he subordinated his own interests for the good of his fellow practitioners by absenting himself from his practice and stubbornly attending important Association meetings when his physical strength did not warrant.

A man of comparatively few words, his experience in Association affairs made his judgment of medical policies particularly valuable. Easily approachable, he had a multitude of friends who loved and held him in high esteem. He held the accumulation of this world's goods of little importance. Devoted to his family, fond of his friends, an ardent patriot, ever ready to sacrifice his own interests and convenience to the welfare of his fellow practitioners—who can deny that he found the road to Camelot?

The State Medical Association has lost one of its most valuable and beloved members. His memory will long live in the hearts of his associates.

More About Heat Prostration

THE intense heat of last summer has focused attention on the subject of heat prostration and certain facts have been brought out which should be of value not only in the treatment of this serious condition, but, what is more important, in its prevention. A symposium* on the subject was held last month by the Minnesota Pathological Society from which it seems clear that the explanation of the syndrome produced by excessive heat will be more likely explained by the physiologist than the pathologist. Reports of studies conducted at Boulder Dam have furnished the most valuable material for our understanding of the causes of heat prostration. In 1931 there were 150 cases of heat prostration and seventeen deaths among the laborers at the Dam. As a result of a study of the subject and remedial measures taken, there were only seven mild cases and no deaths in 1932.

The clinical picture of the patient suffering from excessive heat is not clear cut. The term "heat hyperpyrexia" seems best to designate the patient suffering from excessive heat, be it from the direct rays of the sun or from an excessively hot atmosphere. These people are likely to suffer from premonitory symptoms of lack of appetite or muscle cramp and then present the picture of high fever, dry skin, cyanosis and shock. The nervous manifestations of restlessness, delirium or coma indicate the effect of the disturbance of the brain function; the rapid pulse and low blood pressure are indicative of shock.

In contrast to the above picture some are in shock but have a normal or subnormal temperature and a cold clammy skin. This picture has been termed "heat exhaustion." It is difficult to know in which class many intermediate cases belong.

Among contributing causes of heat prostration may be mentioned a succession of hot days, high humidity, little breeze, improper clothing and dwelling in the city in contrast to the country. Those suffering from cardiorenal disease or who are along in years, are for the most part affected.

Analysis of the pathologic findings at death fails to throw much light on the cause of death. Noble* described wet brains, fatty livers, terminal pneumonias and a generalized vascular dilatation in all the organs.

Rather must we turn to the physiologists for an explanation of heat prostration. A constant temperature is maintained in the human organism by peripheral nerve control and by a center in the region of the hypothalamus of the brain. Excessive heat promotes perspiration and the latent heat of evaporation of the sweat cools the blood in the dilated blood vessels of the skin. The quarts of water lost to a laborer in an excessively hot dry atmosphere have to be replaced. Along with the sweat, salt is lost and unless additional salt is added to the diet in considerable amount the symptoms of heat exhaustion are liable to occur. It is this disturbance of the distribution of the sodium, potassium and the chlorides which plays an important part in the clinical picture. Probably as important a factor is the insufficient blood volume resulting from

*Symposium on Heat Exhaustion; Neurological symptoms, Dr. Royal C. Gray; Mineral and water balance, Dr. Irvine McQuarrie; The changes found at postmortem, Dr. John F. Noble; Mechanisms of heat regulation, Dr. Maurice B. Visscher.

lack of water and dilated blood vessels. Peripheral resistance is lowered and the heart lacks sufficient blood volume to work efficiently. Although such a patient may appear to be suffering from a plethora because of his cyanotic appearance, the opposite is true.

Briefly then, the following treatment is indicated. The patient presenting the picture of heat hyperpyrexia should be cooled by wrapping in a wet sheet and applying ice packs. Fluid and salt should be given in the form of from 1,000 to 2,000 c.c. of normal saline solution intravenously. Intravenous glucose to the amount of 1,000 c.c. of five per cent concentration is also desirable. For the patient presenting the picture of heat exhaustion with a cold clammy skin and a subnormal temperature, liquids and heat rather than cold are indicated.

We know of no better example of the greater value of prevention compared with cure, than in heat prostration. The provision of plenty of water, additional salt, light clothing, proper housing to assure rest and relief from excessive heat, light diet, avoidance of alcohol and excessive smoking are all important, to say nothing of the early detection of signs of heat prostration.

Status of Picrotoxin

The Council on Pharmacy and Chemistry reports that Picrotoxin, which is an extremely active poison, has long been proposed for use in a variety of conditions, including poisoning with chloral hydrate; but a wide experience has always resulted in its falling into practical disuse. Calling attention to the recent work of Maloney and others indicating that picrotoxin may have a certain value in combating the acute toxic effects arising from overdosage with barbital and its derivatives, Eli Lilly & Co. asked the Council to consider Ampoules Picrotoxin (Lilly) for admission to New and Non-official Remedies as an agent for use in this condition. The Council is, however, convinced that the evidence now available for this use does not justify the placing of a marketed product in the hands of the general practitioner irrespective of his facilities for using it with the greatest benefit to his patient, for determining its therapeutic value and contributing the evidence in a satisfactory way. When informed for the Council's attitude in the matter of offering picrotoxin to the general practitioner, Eli Lilly & Co. announced its intention of withdrawing its Picrotoxin Ampoules from the market. The Council desires to express its appreciation of this enlightened action on the part of the firm and to voice the hope that other manufacturers of pharmaceuticals will refrain from making picrotoxin generally available until competent investigators have cleared up the questions of its safety and clinical effectiveness.—(J.A.M.A., Aug. 1, 1936, p. 354.)

OF GENERAL INTEREST

Dr. A. L. Pertl, formerly of Windom, has moved to Canby, Minnesota, where he is associated in practice with Dr. L. J. Holmberg.

* * *

Dr. Ralph M. Tovell, formerly with The Mayo Clinic, Rochester, is now Chief Anesthetist at the Hartford Hospital, Hartford, Connecticut.

* * *

Dr. Leo R. Prins, Saint Paul, and Charlotte Leona Molstad, Minneapolis, were recently married and are at home at 231 Dayton Avenue, Saint Paul.

* * *

Dr. J. S. Kilbride has disposed of his practice at Canby, Minnesota, and is now associated with his son, Dr. E. A. Kilbride, at Worthington, Minnesota.

* * *

Dr. Jerome F. Smersh of Owatonna received his formal award of membership in the American College of Surgeons at the recent meeting held in Philadelphia.

* * *

Dr. P. C. Petersen, who has practiced at Ogilvie, Minnesota, the past two years, has moved to Braham, Minnesota, where he will be a member of the Braham Hospital staff.

* * *

Dr. Henry E. Michelson of Minneapolis has been invited to address the Milwaukee Dermatological Society on the subject of tuberculosis of the skin at the November meeting.

* * *

Dr. Porter P. Vinson, formerly of the Mayo Clinic, Rochester, has opened an office at 300 Medical Arts Building, Richmond, Virginia, for the practice of internal medicine, bronchoscopy, esophagoscopy and gastroscopy.

* * *

On October 18, 1936, St. John's Hospital, Saint Paul, celebrated its twenty-fifth anniversary with appropriate ceremonies. Dr. F. J. Plonske has been medical director and Miss Magdalena M. Ran, superintendent, since its founding.

* * *

Dr. F. W. Behmler, who has practiced in Appleton, Minnesota, for the past twelve years, has moved to Morris, Minnesota, where he will be associated with Dr. C. E. Caine. Dr. Behmler will specialize in surgery in his new location.

* * *

Announcement has been made of the marriage of Miss Sadie Mayal of Hibbing, Minnesota, to Dr. Robert Grau of Saint Paul, which took place November 6 in Minneapolis. Mrs. Grau, before her marriage, was supervisor of the women's medical ward at the Ancker Hospital, Saint Paul.

Dr. John Earl, Saint Paul, began the practice of surgery and obstetrics in May, becoming associated with his father, Dr. Robert Earl of the Earl Clinic. Following graduation from the Harvard Medical School, Dr. Earl interned at Bellevue Hospital, New York City, and at the Boston Lying-in Hospital.

* * *

Dr. and Mrs. Horace Newhart of Minneapolis have returned from a two months' vacation in Europe. While in Germany Dr. Newhart attended the Third International Oto-Rhino-Laryngological Conference in Berlin, as a delegate of the American Otological Society and the American Laryngological Association.

* * *

Dr. Williiam P. Sadler was elected president of the Northwestern Hospital staff, Minneapolis, for the ensuing year at the annual meeting of the staff on October 13. Other officers named are: Dr. Williiam A. Hanson, vice president; Dr. Donald Daniel, secretary-treasurer, and Dr. A. E. Benjamin and Dr. C. B. Wright, executive committee members.

* * *

Dr. William P. Finney of Rochester was elected president of the Alumni Association of the Mayo Foundation at the annual meeting held in Rochester the first of November. Dr. James M. Hayes, Minneapolis, is first vice president; Dr. E. E. Larson, Los Angeles, second vice president; Dr. J. Richards Aurelius, Saint Paul, secretary; and Dr. L. E. Prickman, Rochester, associate secretary and treasurer.

* * *

The marriage of Dr. A. Russell Aanes, son of Dr. and Mrs. A. M. Aanes of Red Wing, and Miss Irene Lucille Persgard of Duluth, took place Saturday, September 26, at the home of Dr. P. C. Benton, Minneapolis. Mrs. Aanes is a graduate of the University of Minnesota School of Nursing and Dr. Aanes is serving his internship at General Hospital in Minneapolis. Dr. and Mrs. Aanes are at home at 507 East Fourteenth Street, Minneapolis.

* * *

Dr. Maurice B. Visscher has been appointed professor of physiology and head of the department at the University of Minnesota. Dr. Visscher received his M.D. and Ph.D. degrees at the University of Minnesota. During the years 1925-1927 he had a National Research Council Fellowship in the Medical Sciences at University College, London, and the University of Chicago. Since then he has headed the department of physiology at the Universities of Tennessee, Southern California and Illinois.

* * *

Dr. G. B. Weiser, of New Ulm, was honored at a testimonial banquet last month given by the members of the Redwood-Brown County Medical Society.

Dr. Weiser has practiced medicine in New Ulm for more than forty-three years. After graduating at Jefferson Medical School in 1879 he practiced for fourteen years in Pennsylvania before coming to New Ulm in March 1893. Since that time he has practiced continuously in New Ulm and has earned the respect and esteem not only of his fellow citizens but of his fellow practitioners, testimony to which was given in brief addresses by members of the society on the occasion of the banquet.

* * *

The Medical Library Association at its annual meeting in Saint Paul, June 22, 1936, passed resolutions calling attention to the fact that during the past three years the appropriations for the Library of the Surgeon-General's Office (Army Medical Library) have been wholly insufficient to allow the purchase of current medical books and periodicals for the maintenance of the library in its preëminent position as the greatest in the world. After three years' delay volume one of the fourth series of the Index Catalogue of the library has appeared, the delay having been due to insufficient funds. The Medical Library Association, realizing the importance to the medical profession, urges doctors to write their congressmen urging sufficient appropriations at the coming session which opens in January.

BCG as a Tuberculosis Preventive

There are a number of reasons why the use of the living vaccine known as BCG, twelve years after its first use in France, should still be discussed and debated among those concerned with the prevention and cure of tuberculosis. It has never been conclusively demonstrated that the use of this vaccine is an effective means of preventing human tuberculosis. The greatest value of BCG is in cattle, but, in view of the variation in reported results, one could scarcely conclude that it is justifiable to use it universally in man. Experiments in animals have shown little value for the oral method as a means of prevention. The subcutaneous method and the intracutaneous method are variable in their results in animals. The intravenous method of vaccination has proved to be the most efficacious in cattle, although this also varies within wide limits. The greatest difficulty has been to determine how long the period of increased resistance lasts. This also apparently varies in many instances and is often of short duration; that is, under one year. Many different cultures of BCG have been sent to the United States in the hands of various persons, laymen and physicians alike. Different workers have used cultures obtained at different times from the French laboratories. The result is variation in the experimental work that has been carried on, for little has been done to check to the constancy of the characteristics of these strains. The results of these studies have been published from time to time. They are among the best attempts in the world at adequate control comparisons, but one can only conclude, after studying them, that they do not provide conclusive evidence for general use of the vaccine. Sufficient arguments can, however, be presented for the use of this vaccine in groups for which little can be done by other methods, as, for example, the Negroes in the South and the Indians on the reservations, where the present machinery is not adequate in view of the peculiar circumstances surrounding their condition. That there is no conclusive proof of the efficacy of the vaccine in man is in part due to the short duration of the experiments and to the small number of those involved in the carefully controlled experiments as well as to the inadequacy of the accurate data on the control groups.—(J.A.M.A., July 11, 1936, p. 132.)

In Memoriam

Michael H. Egan

1865-1936

DR. M. H. EGAN was born on a farm near Rogers, Minnesota, in 1865. He graduated from Hamline Medical College in 1886 and served his internship at St. Cloud. The following year he acted as a railroad physician for the road being built from Saint Paul to Winnipeg.

In 1889 Dr. Egan located at Hetland, South Dakota, but moved to Sioux Falls, South Dakota, in 1904, where he rounded out nearly forty-seven years of general practice. He was a member of the South Dakota State Medical Association and the American Medical Association. His death occurred at Evanston, Illinois, April 26, 1936.

Dr. Egan is survived by his widow, two sons, Dr. E. M. Egan of Chicago and F. H. Egan of Evanston, a daughter, Mrs. D. L. Moberg of Evanston, and one sister, Mrs. J. P. Flynn of Rogers, Minnesota.

David Simon Fleischhauer

1877-1936

DR. DAVID S. FLEISCHHAUER of Wabasha was born at Kitchener, Ontario, January 27, 1877. His early education was received in Reed City, Michigan, where he graduated from high school in 1894.

He attended college at the University of Michigan and later obtained his M.D. degree at Cornell in 1899, taking postgraduate work at the Eye and Ear Infirmary, Maternity Hospital and Governor Hospital, all in New York City.

Dr. Fleischhauer began practice in New York City but after a year returned to Reed City, Michigan, where he practiced until 1910 and then moved to Wabasha, Minnesota.

On December 24, 1906, Dr. Fleischhauer was married to Isabella Booth of Reed City. She and two children, Katherine Elizabeth (Mrs. J. M. Evans of Wabasha), and David Booth, a student at Carleton College, survive him.

Dr. Fleischhauer was mayor of Wabasha in 1918 and served as a Lieutenant in the Medical Corps of the Army in 1918 and 1919. He was president in 1916 of the Wabasha County Medical Society, which he joined in 1910. He was a 32nd degree Mason, holding membership in the chapters at Winona, Lake City, and Saint Paul. He was a member and past president of the Lion's Club of Wabasha, a member of the Eastern Star and the American Legion. He had been a member and trustee of the First Congregational Church of Wabasha for years.

Dr. Fleischhauer's death from pneumonia occurred on October 14, 1936. All the physicians in the county acted as honorary pall bearers and in addition Dr. Tenney of Alma and Dr. Hallenbeck of Rochester. A Guard of Honor from the American Legion and the Mayor and Aldermen of Wabasha attended the funeral.

Wabasha has lost a prominent citizen and the profession one of its most valued members. Dr. Fleischhauer was an outstanding example of a fine type of physician, ever ready when his professional service was needed and active in the civic affairs of Wabasha.

L. D. Hughes

1888-1936

DR. L. D. Hughes, Minneapolis, died suddenly at his office in the Medical Arts Building Friday, October 23, 1936, at the age of forty-eight.

Dr. Hughes was born at Carbondale, Illinois. He was graduated from the University of St. Louis medical school and began practice in Minneapolis in 1919.

During the World War Dr. Hughes was a lieutenant in the medical corps and was attached to the 135th infantry. He was a major in the 135th infantry in the National Guard.

He was a member of the Hennepin County Medical Society, the Minnesota State Medical Association, the American Medical Association. He also was a member of the Minneapolis Athletic Club and the Minneapolis Automobile Club.

Dr. Hughes is survived by his wife; two daughters, Elsie Claire and Lois; a son, David; and his mother, Mrs. William Trail of Carbondale.

A. A. Laurent

1882-1936

DR. A. A. LAURENT, Minneapolis, died October 21, 1936, after a short illness.

Born at Hamel, Minnesota, Dr. Laurent had resided most of his life in Minneapolis. He attended the public schools in Minneapolis and graduated from the University of Minnesota medical school in 1911. He took postgraduate work at the Mayo Clinic, Rochester, and in Chicago. He went abroad for further study.

Dr. Laurent was a member of the Hennepin County Medical Society, and was on the medical staff of St. Mary's, St. Barnabas, Northwestern and Deaconess hospitals.

Dr. Laurent's father was also a physician, having received his education in France, but having practiced for fifty years at Hamel. Dr. Laurent's wife died last March. He is survived by two brothers, Albert Laurent of Minneapolis and Emil Laurent of Hamel, and three sisters, Mrs. Josephine Hamel of Hamel, Mrs. Emily Gagne of Minneapolis, and Mrs. Virginia Snow of St. Louis Park.

Harper M. Workman

1855-1936

DR. HARPER M. WORKMAN was born May 14, 1855 in Circleville, Ohio, the son of Daniel and Virginia McWorkman. In 1857 his family moved to Keosauqua, Iowa, where most of his childhood was spent. He received his general education in the local schools and his professional training from Chicago Medical College—a part of Northwestern University. After his graduation in 1878 he entered the employ of the surgical department of the Chicago & Northwestern Railway and later was sent to Sleepy Eye, which was the division point of the Northwestern at the time. In 1883, when the division was moved to Tracy, he established himself there and served as division surgeon until the time of his death.

In 1886 he was married to Nellie M. Gleason, to which union was born one son, Warner Gleason Workman. Mrs. Workman preceded him in death in 1910.

He was the first mayor of Tracy, president of the school board for over 20 years, a member of the Tracy volunteer fire department for over 35 years, secretary of the Lyon-Lincoln Medical Society for long periods, a number of the American College of Surgeons, president of the Minnesota State Medical Association and president of the Council of the State Association at the time of his death.

He was a member of the Tracy Masonic Lodge number 155, of Bower Chapter number 44 and of Marshall Commandery. He was one of the charter members and the first patron of Virginia Chapter O. E. S., and his mother, for whom the Chapter was named, was its first matron.

One of the charter members of the Kiwanis Club, he was, perhaps its most loyal member, never missing a meeting if he was physically able to attend. For many years he had been its secretary.

An American with his ancestral roots firmly established in Colonial soil, he was deeply and ardently proud of the record of his family through many generations in the defense of their country. Although he himself was barred from military service by his age and health, in both the Spanish American and World Wars, he gave without remuneration unstintedly of his time and strength in office work for his government.

The same dauntless spirit which carried him on horseback to the railroad construction camps between Sleepy Eye and Pierre and through blizzards across the roadless prairies in his early days in Minnesota, took him to his office daily, when a less courageous man would have been bedfast. He doggedly clung to life and its activities until death quenched his brave spirit.

Through his long life he has been the staunch friend of the young people, several generations of whom have found in him an advisor who understood and sympathized with them in their troubles and rejoiced with them in their happiness, who was tolerant of their failures and proud of their successes.

In his passing, Tracy loses one of its most picturesque and lovable pioneers—a man whose unflinching code of uprightness and loyalty to his principles was never swerved by motives of self interest. He spoke his convictions fearlessly and lived them unfalteringly.

The treasure he laid up for himself and his family was not material but the love of a host of friends and a life filled with love, kind deeds, sympathy and understanding.

His body was escorted from the home to the Masonic Temple by a guard of honor of the Knights Templar, the local Masonic lodge, and a large number of honorary pall-bearers. The services at the Temple were conducted by the Marshall Commandery, with Mr. C. G. Porter Acting Commander. Responding to his request made about a year ago, Dr. O. J. Hagen of Moorhead gave his funeral oration. Dr. Hagen wore the cap and gown of the American College of Surgeons, of which group he and Dr. Workman were members. He was laid to rest in the Tracy Cemetery, where the last rites were conducted by the Tracy Masonic Lodge, Past Master Starr presiding.

Out of town relatives attending the funeral were Mr. Morris Workman, a brother, of Minneapolis, Dr. and Mrs. H. A. Tarbell, brother-in-law and sister, and their son and daughter-in-law, Dr. and Mrs. Gleason Tarbell of Watertown.

Honorary pall-bearers were Drs. W. W. Will of Bertha, W. A. Coventry of Duluth, S. H. Boyer of Duluth, J. M. Haves of Minneapolis, E. J. Simons of Swanville, W. L. Burnap of Fergus Falls, B. S. Adams of Hibbing, E. A. Meyerding of Saint Paul, E. T. Sanderson of Minnesota, L. L. Sogge of Windom, B. J. Branton of Willmar, W. D. James of Tracy, J. T. Christison of Saint Paul, F. J. Savage of Saint Paul, and Mr. Manley Brist of Saint Paul. Other doctors accompanying the body to the Temple were Doctor Johnson, Patterson, Bolyn, Hauge, Scofield, Chesley, Homberg, and McKeown.

Kaiseraire Filter Ventilator Not Acceptable

This ventilator, manufactured by the H. S. Kaiser Co., Chicago, is marketed under the claim that it removes the "pollen that causes hay fever" and retards and prevents various diseases by "preventing germs from entering the rooms and offices in which people live and work." The filter mat is arranged in layers so that air, laden with dust and pollen, in order to pass through the filter has to travel in a zigzag manner. The filter mat is very heavily coated with a thick, very pungent oil, to which the dust and pollen particles are expected to adhere. Air is forced through by means of two fans of the ordinary blade type. The pollen counts indicate a percentage of efficiency for this filter which may afford the mildly sensitive hay fever subject some freedom from symptoms but they indicate inadequateness of the filter for the severe type. The filter would be ineffective in localities where very highly antigenic pollens are found. In the opinion of the Council on Physical Therapy, the Kaiseraire Filter Ventilator does not possess adequate efficiency for removing pollen from the air; the volume of air it displaces is insufficient for comfort, and the presence of a pungent, penetrating odor is considered objectionable and possibly harmful to sensitive individuals. Therefore the Council on Physical Therapy voted not to include the Kaiseraire Filter Ventilator in its list of accepted devices.—(J. A. M. A., May 16, 1936, p. 1731.)

MEDICAL ECONOMICS

House of Delegates: Special Meeting

THE first special meeting of the House of Delegates ever to be called in Minnesota is about to convene as this issue goes to press.

The principal issue before the delegates is not new. Medical care for the indigent and those in the low income group has been the subject of conference, negotiation (often futile) and public scandal for many years.

Unique Opportunity

The opportunity to introduce fundamental reforms that will be uniform for every county in the state, however, has never presented itself before.

Two separate state bodies are now studying the situation with a view to introducing uniform handling of all relief and welfare activities of the state. One of them, the Interim Committee of the Legislature, will take final action directly after election on recommendations made to it during the last few months.

Medical care bulks large in all relief, welfare and social security programs, so-called.

To be Presented to the Interim Committee

Principles which should be established in the law for proper handling of medical care for all the needy and also for recipients of all social security benefits should be definitely enunciated by the House of Delegates. They will be presented to the Interim Committee within the week and will be before that Committee as it shapes legislation.

Planning Board at Work

At the same time, an advisory committee to the State Planning Board is also engaged in making a general survey of relief and welfare needs in Minnesota. This committee, with federal money to finance it, will make its report to the planning board and thence to the governor for whatever action he may see fit to suggest to the legislature.

It is gratifying to note that representation of the state medical association on this latter committee was asked by the Board. Dr. O. E. Locken, Crookston, speaker of the House of Delegates, and Dr. W. A. Coventry, Duluth, past president of the association, were appointed and are meeting regularly with the committee.

Thanks to Dr. J. L. McLeod, Grand Rapids, state senator and member of the Interim Committee, the interests of the physician and the patient (their interests are necessarily identical) will be ably defended in the other body.

"Our Chance"

All medical phases of the social security program, including medical care for recipients of Old Age Assistance, future developments in unemployment insurance and the public health provisions of the program generally must be considered by the delegates.

The call of president W. W. Will, of Bertha, went out to delegates, committee chairman, officers and other leaders, October 13.

Said President Will:

This is our chance to introduce into this new legislation a uniform and sound system of medical care for the needy of the state. It is as important to the public welfare and the medical profession as the Basic Science legislation of 1927.

Co-operative Commonwealth

From a recent *New York Times Magazine* story on Coöperatives:

"Long before the recent converts (to the coöperative movement) began showering publicity on consumer cooperation, it was being practiced quietly and undramatically in Minnesota and Wisconsin by farmers of Scandinavian origin."

"This has alarmed private business," says the *Times*, "which sees in Minnesota, Wisconsin and the surrounding states things reminiscent of what happened decades ago in England and Sweden where today consumer coöperatives do 40 to 50 per cent of the business in

certain lines. *How far, then, has this movement progressed in Minnesota, the Nation's most coöperative state?* And what are its ultimate objectives?

"Co-operative Medical Offices"

"To find out one journeys to Minnesota, buys apples at a little country coöperative grocery, fills his gas tank at coöperative service stations, wanders through huge coöperative warehouses and creameries, talks over co-operative telephones, reads coöperative newspapers, visits well-furnished *coöperative medical and auditing offices,* sleeps in a coöperative boarding house, eats in a coöperative cafe, sends linen to a coöperative laundry, reads tombstones in a coöperative cemetery. And one ends up by being a trifle amazed." . . . (Italics and titles are ours.)

A Trifle Amazed

The reader from Minnesota is also a trifle amazed. He suspects that the *Times* correspondent was enlarging a little on the facts to make a story.

At the same time, the threat or hope, according to your own bias, of a coöperative commonwealth comes increasingly closer.

New Dealers are publicly interested in co-operatives and government money has been spent under the Resettlement program to subsidize certain consumer coöperatives. Churchmen are interested.

Pocketing Profits

If the movement is successful on a big scale in America, political economists declare that it will not be confined to the retail coöperatives.

Says Government Bulletin No. 598 issued by Isador Lubin, commissioner of the Bureau of Labor Statistics:

"The average working man who joins a retail co-operative thinks only of saving for himself the retailer's small profit. He does not take due account of the fact that retail coöperative societies unite to form wholesales and that these wholesales go into manufacturing and the production of raw materials and that the great coöperative movement of the world is moving to put into the pockets of consumers that vast fund known as the profits of business. This is known to be a concrete fact in those countries where a large part of the people supply their needs through their coöperative societies."

Medical Needs Next

It goes without saying, of course, that the "great coöperative movement of the world" will move on to include medical care among the needs that coöperative societies will try to supply.

How does business feel about it? Will it succeed? These are important questions to the doctor.

J. T. Meek writing in the *Illinois Journal of Commerce* makes several observations which apply to professional services as well as to business:

"Business Must do a Better Job"

"Business cannot beat the coöperatives," he says, "by holding up the shining light of the functions of private enterprise over the century. It cannot beat it by damning it. On the contrary that is the surest way to make it grow.

"It can beat the coöperative, primarily, by doing a better job of distribution than the coöperatives are doing. . . .

"It will be a sad mistake if certain lines of business feel that they are free from the threat of the consumer coöperative because they are big; because they are in metropolitan centers; or because they deal in style, drugs, cosmetics *or otherwise highly specialized lines. As coöperative communities grow in size, advances into these fields may be expected.*

Here to Change Things

"The coöperative is here to change things and whether it will live because the business world refuses to accept the challenge or die because the business world accepts it is up to business itself."

* * *

There are no well organized functioning medical coöperatives in Minnesota—yet, the *New York Times* story notwithstanding.

One northern Minnesota society is just now taking steps to change its charter, however, so that it may organize any "needed services" on a coöperative basis. There is talk.

Organized Medicine will not be able to beat medical coöperatives, either, by damning them.

Field Army for Cancer

A new campaign for popular education about cancer is about to be launched in Minnesota with the approval of the Council of the Minnesota State Medical Association and the Cancer Committee.

It is to be carried on by a Women's Field Army organized by the American Society for the Control of Cancer at the original suggestion of the Federation of Women's Clubs.

Cancer Committee Consulted

The Field Army program was brought before the Cancer Committee, of which Dr. Martin Nordland of Minneapolis is chairman, at a recent St. Paul meeting. Plans were laid where-

by the women, assisted by the physicians, will carry on a extensive campaign of education in Minnesota.

The Army, itself, is organized military fashion under a state commander, Mrs. Harlow Hanson of Minneapolis, health chairman of the Minnesota State Federation of Women's Clubs. Under Mrs. Hanson are captains and other officers, a state division composed of representatives of all state women's organizations, local units and local chairmen and officers.

Organization

The whole is under the supervision and direction of the state chairman of the American Society for the Control of Cancer, Dr. W. A. O'Brien, of the University of Minnesota, an Executive Committee composed of members of the state medical association's Cancer Committee and a state advisory committee composed of the state chairman and executive committee and other influential and interested individuals. This state advisory committee will meet annually or semi-annually and assign special problems brought to it to special sub-committees to handle.

The activities so far specified include mass meetings, lectures, radio broadcasts, newspaper and magazine articles, exhibits, distribution of literature.

To Dispel Fear

The object is to dispel cancer fear and to bring a message of hope, particularly to American women.

Members of the Cancer Committee expressed a cordial interest in the project, promised their active interest and support. The headquarters of the state medical association, at the behest of the committee, will extend every possible assistance to the Field Army and its commander, whose immediate objective is, of course, the complete organization of the women of the state.

The committee will write to medical society secretaries all over the state for a list of competent local speakers on the subject.

Best Defense

It has long been recognized by medical society officials and public health authorities that the cancer situation might at any time afford a pretext for the inauguration of state services for detection and treatment.

Whole-hearted backing and assistance for a well organized popular movement for the early detection and proper treatment of cancer is the best possible defense against unwarranted establishment of state medicine for cancer victims.

The interest of organized medicine in cancer is not confined to its strategic importance to the public policies of medical societies.

Cancer Exhibit

An important section of the scientific exhibit section of the 84th Annual Meeting of the Minnesota State Medical Association to be held in St. Paul in May is to be devoted to cancer. Plans for the exhibit were shaped at the same committee meeting. Dr. H. E. Robertson of Rochester is to be in charge and doctors who attend the meeting are to be invited to submit sections for examination and discussion of the exhibit by pathologists.

An unusual cancer exhibit will feature the scientific exhibit section of the 84th Annual Meeting of the Minnesota State Medical Association at the St. Paul Auditorium May 3, 4 and 5.

Attending physicians will be invited to bring in specimens and sections for examination, diagnosis and discussion by pathologists at the exhibit booth.

The exhibit will be staged under the direction of Dr. H. E. Robertson of Rochester, exhibit chairman, Cancer Committee, Dr. O'Brien and Dr. Martin Nordland of Minneapolis.

Success in Defense

(Monthly Editorial by the Medico-Legal Advisory Committee)

Recent cases in our state illustrate various phases of the work of your Medico-Legal Advisory Committee and the excellent spirit of cooperation which is beginning to invade the ranks of the thinking members of our society. For instance:

(1) A physician of middle age was sued by a patient because of alleged unskillful handling of a fracture case. He was not a member of our society nor did he have insurance. The members of the county society interested themselves in his trouble because they were fearful of the reaction on the medical profession through an adverse decision. They attended court, testified in his behalf, and assisted his defense in every honorable way. Result: a verdict for the doctor

and a cementing together of the profession in that locality.

(2) Several members of a county society were sued because of alleged negligence in performing an abdominal operation. The patient was seen by a member of the society who made unprofessional and unethical remarks. Suit was started. This member then testified for the plaintiff. Result: verdict against the doctors for several thousand dollars; the immediate raising of premiums of all members carrying insurance in the indemnifying company in this state; and a threat by this company to withdraw from the county involved. If they do, it will leave many members without insurance protection.

(3) A member was sued for alleged malpractice following an automobile accident. Insurance company was notified; your committee was not notified because of the defendant's feeling of reluctance to let outsiders know of his troubles. Case (justifiable or unjustifiable) was settled by the insurance company, and another black spot entered on the insurance companies' books because the member did not feel the spirit of cooperation.

It is certain that no one is above censure for poor work or neglect of a case, but certainly all should not pay increased premiums because of the wish of a member to hide, because of false modesty, behind an unjustifiable settlement.

(4) A prominent member of our society was sued because of alleged mistreatment of a leg condition. He followed out the usual procedures recommended by the committee—insurance representatives consulted by the committee, defense properly lined up, members of the society in attendance at Court, testimony given by prominent members of the locality. Result: complete exoneration by jury of any wrong practice and the dignity of the profession upheld.

In defense of these cases your committee should be consulted at once by sending in your card to the office of the State Association. The customary procedure outlined by the committee will then be carried out in the members' behalf. Proper cases, after investigation, will be assisted and the unfortunate results in many suits in the past eliminated.

The Medico-Legal Advisory Committee believes that success in defense lies in coöperative effort. That which concerns one concerns all.

"Siren Song"

From a recent address by Dr. Floyd S. Winslow, president of the Medical Society of the State of New York:

"The advocates of socialized medicine lure the profession with the siren song of bureaucratic jobs, assured income—security—false security. We do not want to be secure. We want to remain insecure. We want to continue to be required to give our very best to every patient or lose out in the gentlemanly competition which exists within our ranks. This is an incentive that operates to our insecurity but to the security of the patient. We prefer the discipline of private practice which keeps us on our toes, to an assured income under bureaucratic control where our highest ambition is more likely to be to keep ourselves solid with the politicians who have taken over the job of running our profession."

For Insecurity

"I repeat, security for the doctor means insecurity for the patient. . . .

"And it cannot be too emphatically put that it is incumbent upon us . . . to prevent those whose occupation it is to *talk* about medical care, from inaugurating visionary proposals tending to prevent us, whose occupation is to *provide* medical care, from keeping faith with our patients and with the public. We have been accused of thinking only of our bank accounts when we oppose compulsory health insurance. When did we ever think only in terms of our banks accounts? Where is there another profession which is so impersonal in its primary objects, working so surely, and so effectually, fighting every kind of disease, driving out of existence, if it were possible to do so, the very source of our income?"

Dr. Winslow's address was printed in "Vital Speeches of the Day" published by the City News Bureau of New York City. The New York State Society is now carrying, with great success, its campaign to prevent legislative interference with the private practice of medicine to the newspapers, periodicals and the public platform.

Philadelphia Emergency

Administration of medical relief has reached a turning point in many parts of the country.

The Commonwealth of Pennsylvania abruptly ceased to issue medical orders for persons on relief on September 25.

The Board of Directors of the Philadelphia County Medical Society accordingly took immediate action to assume responsibility on behalf of its members for providing medical care to the

needy of Philadelphia from September 25 to December 31, 1936.

During the three month period thus provided, the society will make every attempt to set up an equitable plan under which patients on relief may be cared for and necessary funds may be allocated from city, state or private philanthropy to maintain the plan.

Inquiries have been sent to many state and county societies throughout the country for information that might be of assistance in formulating plans for Philadelphia. The indication is that Philadelphia physicians are interested in the possibilities of a scheme for payments by lump sum to the county society which will in turn be pro-rated to members or put into a common fund.

Johnson Memorial

The Herman M. Johnson Memorial Fund is growing: Total received to date, $1,495.95.

Most interesting among recent contributions were those received from county societies as a whole. Renville County Medical Society contributed $42 from its members; Winona County Medical Society, $26.

The largest contribution from an individual to date is $100; the smallest, one dollar.

The objective set by the committee is a fund of $2,000. The fund will be used mainly to establish a lectureship in economics as they affect medicine at the University of Minnesota. The first lecture will be held this winter, the committee hopes.

Wanted: C. C. C. Doctors

There are almost continuous vacancies for young medical men in Civilian Conservation Camp work in the Minnesota-North Dakota District.

Lieutenant Colonel J. W. Sherwood, Medical Corps, Fort Snelling, is district surgeon in charge of the work. Colonel Sherwood and the Surgeon of the 7th Corps Area at Omaha have both asked all medical publications in this district to inform physicians of the fact.

The reason for frequent vacancies lies in the fact that many of the younger men accept the appointments and remain on duty only until they have saved enough money to go into private practice.

The usual procedure requires that appointments be made from the ranks of Medical Reserve Officers below the grade of Major. Special arrangements can be made, however, for any physician under the age of 35 to be furnished a reserve commission in the grade of first lieutenant. A contract can be given him immediately on a full time basis while action is pending on his application for commission.

There are three vacancies in the Corps at the present time, according to Colonel Sherwood, and several more are expected in the near future.

Minnesota State Board of Medical Examiners

Self-Styled "Specialist" Pleads Guilty

Re: State of Minnesota vs. Francis Howard Punchard, Sr., alias, J. Francis Clark

After spending thirty-three days in the Minneapolis City and County Jail, Francis Howard Punchard, Sr., alias J. Francis Clark, fifty-six years of age, entered a plea of guilty to an information charging him with practicing healing without a basic science certificate. This plea of guilty was entered on October 5, 1936, before the Honorable W. C. Leary, Judge of the District Court.

Punchard, who holds no license to practice medicine in the State of Minnesota, nor in any other state, was arrested on September 2, 1936, in Minneapolis following an investigation conducted by the State Board of Medical Examiners. This investigation disclosed that Punchard had been to a number of homes in Minneapolis where he posed as a skin and cancer specialist and obtained money from a number of patients. When Punchard was arraigned in Court on September 3, 1936, his bail was set at $2,000, which he was unable to furnish. Subsequent investigation disclosed that Punchard had also called on several patients at Cokato, Minnesota, where he had obtained at least $100 for his services.

From 1916 to 1924 Punchard maintained an office in Minneapolis where he represented himself to the public as a physician and surgeon. He had no license at that time and was warned by the Minnesota State Board of Medical Examiners to cease practicing. He left the State of Minnesota and has been carrying on his activities in Chicago, Illinois, Madison, Wisconsin, and other places in that vicinity. He was arrested in Chicago and pleaded guilty on October 26, 1932, to a charge of practicing medicine without a license. He was fined and given a jail sentence. Punchard has represented himself on various occasions as being a graduate of Oxford, the University of Maryland and other schools. He has also represented himself as being connected with the Rockefeller Foundation. When in court in Chicago, in 1932, he stated that he had been in this country ten years, having come from England. However, the investigation discloses that Punchard was married in New York City on August 30, 1903.

Following the presentation of the facts to the court, Judge Leary sentenced Punchard to a term of six months in the Minneapolis Workhouse, and he was given one week in which to leave the State of Minnesota. He is not to return to this State for a period of five

years. If Punchard should return or attempt to practice healing in any manner, the stay will be vacated and Punchard will be required to serve the workhouse sentence.

Indian "Doctor" Gets One Year at Hard Labor at Rochester

Re: State of Minnesota vs. Mels White, alias Mike Roller, alias Marion Roller, alias Marion Royle

Mels White, alias Mike Roller, alias Marion Roller, alias Marion Royle, who has represented himself on various occasions as being anywhere from thirty-six to fifty years of age, and who states that he is a full blooded Osage Indian from Oklahoma, but who has spent most of the past ten years in the Wisconsin State Prison, entered a plea of guilty to an information charging him with practicing healing without a Basic Science Certificate on October 8, 1936, before the Honorable Vernon Gates, Judge of the District Court, at Rochester, Minnesota. Judge Gates sentenced White to one year at hard labor in the Olmsted County Jail.

During the past summer White has been operating his swindle in the vicinity of Chatfield, Dover and St. Charles, Minnesota. On May 29, 1936, he called at the home of a seventy-four year old widow in Chatfield, who for some time has been afflicted with Parkinson's disease. He told this lady that he, himself, had been afflicted with this ailment and that he effected a cure in his own case from these medicines that he prepared. He demanded cash in advance and was paid the sum of $46.55. For this sum of money three bottles of medicine and one bottle of liniment were furnished to the patient and this was supposed to constitute a three months' course of treatment. The patient took the medicine and is in the same condition today as she was before she started the treatment, except that her small savings account shows a little less because of this swindle. The investigation conducted by the Minnesota State Board of Medical Examiners discloses that White fleeced farmers and others in southeastern Minnesota out of approximately $1,000 and also has obtained approximately $800 by the same methods in the vicinity of Chippewa Falls, Wisconsin, and has a $500 bond posted to guarantee his appearance in the Circuit Court at that place on October 20, 1936. White was arrested at Chippewa Falls on September 18 last, and sales slips giving the names and addresses of many of his patients were found in his possession. These slips also showed the amount of money that he obtained in each case.

In 1917 White served 110 days at the Indiana State Farm at Greencastle, Indiana, on a charge of carrying concealed weapons. At that time he was using the name of Marion Royle. In April, 1926, under the name of Marion Roller, he was sentenced to serve one to ten years on a charge of carnally knowing and abusing a female minor. He served seven years, two months and six days in the Wisconsin State Prison on this charge. He was sentenced from Hudson, Wisconsin. In July, 1934, he pleaded guilty to two charges of practicing healing without a basic science certificate at Janesville, Wisconsin. He was fined $100 or ninety days on each of these charges. On May 8, 1935, he pleaded guilty to a charge of practicing healing without a basic science certificate at Winona, Minnesota, and was fined $200 or two months in the Winona County Jail. He served the jail sentence.

Unless the present jail sentence convinces White that he cannot get by with this swindle in Minnesota, the Medical Board will ask that he be prosecuted for obtaining money under false pretenses. Such a charge is a felony and carries a sentence of five years in the State Prison. In the event that White should be convicted under this law his sentence would be doubled because of his previous conviction of a felony in Wisconsin. It is to be hoped, however, that the imposition by Judge Gates of the maximum sentence provided by law for practicing healing without a basic science certificate, may convince White that he cannot get by with his racket in Minnesota. The Medical Board wishes to express its appreciation for the prompt, efficient and courteous coöperation of Mr. Hayes Dansingburg, County Attorney, of Rochester, Minnesota.

Otoflex Not Acceptable

The Council on Physical Therapy reports that the Otoflex, manufactured by the Otoflex Corporation, Milwaukee, is a device for generating tones which are audible within the ordinary sound range. These tones are generated by an electric oscillator making use of vacuum tubes. The frequency of the tones may be changed at will and the volume increased or decreased. An electric motor provides a method whereby the tone may be automatically varied from very low to very high pitch. The sound is applied to the ear by means of telephone receivers. The device was tested in a clinic acceptable to the Council. In this investigation thirty-one persons were treated, twenty-one women and ten men. More than a thousand treatments were given. The results of the investigation were not convincing, since no significant changes in hearing were noted, either for the better or for the worse. In the opinion of the Council, the corresponding changes in hearing would have been noted if the patients had not used the instrument at all. In view of the negative results of the investigation, the Council on Physical Therapy voted not to include the Otoflex in its list of accepted devices.—(J.A.M.A., Aug. 15, 1936, p. 499.)

Antipneumococcic Serum Types I and II Containing Heterophile Antibodies-Lilly Not Acceptable for N.N.R.

In the report of the annual meeting of the Council on Pharmacy and Chemistry for 1935, it was noted that "A pharmaceutical house is marketing an antipneumococcus serum with the claim that the product contains certain 'heterophile units' and 'neutralizing agents' with the claim that these represent advantages over ordinary products of this class. . . . The Council voted that the firm in question be invited to present the available evidence in order that the Council may consider it and report to the profession on the status of such a product in the light of the evidence for the claims made." This action was instituted and the firm, Eli Lilly & Co., submitted its evidence and rationale for promotion of the product. For the purpose of determining the present status of this preparation, the Council requested Dr. Norman Plummer (instructor in clinical medicine, Cornell University Medical College) to make a report on the addition of these immune factors to antipneumococcic serum. The report of Dr. Plummer appears in The Journal A.M.A., Aug. 15, 1936, p. 499. On the basis of this report the Council declared Antipneumococcus Serum Types I and II Containing Heterophile Antibodies marketed by Eli Lilly & Co. unacceptable for inclusion in New and Non-official Remedies because of lack of evidence of its therapeutic value. The Council desires to emphasize the conclusion of Dr. Plummer that, in the light of present knowledge, recommendation of the combined heterophile serum for general distribution is unwise and unwarranted.—(J.A.M.A., Aug. 15, 1936, p. 499.)

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

The Inter-State Postgraduate Medical Association

The annual meeting of the Inter-State Postgraduate Medical Association held in Saint Paul October 12 to 19, 1936, was well attended. Approximately 3,500 registered, 2,500 of whom were physicians. Doctors were present from every state in the Union except Nevada. Besides some fifty-seven doctors from Canada there were four from England and one each from France, Ecuador, Poland and India.

The scientific program was conducted without delay, for which the local committees under the chairmanship of Dr. E. M. Jones deserve the credit.

Officers for 1936-37 are: Dr. Edward W. Archibald, Montreal, and Drs. Charles H. and William J. Mayo, Rochester, presidents of clinics; Dr. William B. Peck, Freeport, Ill., managing director; Dr. Tom B. Throckmorton, Des Moines, secretary; Dr. Henry G. Langworthy, Dubuque, Iowa, treasurer; Dr. Arthur G. Sullivan, Madison, Wis., director of exhibits; Dr. Mather Pfeiffenberger, Alton, Ill., speaker of the assembly; Dr. George W. Crile, Cleveland, program chairman.

Trustees, in addition to Drs. Miller, Langworthy, Throckmorton, Sullivan and Pfeiffenberger, are: Drs. George V. I. Brown, Milwaukee; John M. Dodd, Ashland, Wis.; Clifford U. Collins, Peoria, Ill.; and John E. O'Keefe, Waterloo, Iowa.

Dr. John F. Erdmann, New York, president-elect, becomes president of the Association for the year 1936-1937 and Dr. Elliott P. Joslin, Boston, is president-elect.

The dinner meeting held Wednesday evening, attended by nearly a thousand members and guests, was presided over by Dr. David Riesman, president of the Association. On this occasion a token of appreciation was presented by the Association to Dr. W. J. Mayo and Dr. Charles H. Mayo. Addresses were delivered by Major General Charles H. Reynolds, Surgeon-General of the Army; Rear Admiral P. S. Rossiter, Surgeon-General of the Navy; Dr. Thomas Parran, Surgeon-General of the United States Public Health Service; Dr. W. J. Mayo; Dr. Charles H. Mayo; Dr. Charles G. Heyd, vice president and acting president of the American Medical Association; Dr. John F. Erdmann, president of the Inter-State Post Graduate Medical Association, and Dr. George Crile of Cleveland.

Minnesota Society of Internal Medicine

The fall meeting of the society will be held at Rochester on November 16, 1936, with the Rochester members acting as hosts to the Society. Dr. Frank J. Hirschboeck, Duluth, is president and Dr. Max Hoffman, 1232 Lowry Medical Arts Building, Saint Paul, is secretary of the society.

Hennepin County Society

At the annual meeting of the Hennepin County Medical Society held Monday evening, October 5, Dr. J. H. Simons was installed as president for the coming year. Dr. R. R. Cranmer, retiring president, who becomes chairman of the Executive Committee, reviewed the work of the past year, and Dr. Simons outlined plans for the coming year. Other officers are: Dr. F. G. Benn, first vice president; Dr. C. E. Proshek, second vice president; Dr. O. J. Campbell, secretary-treasurer; Dr. T. A. Peppard, librarian.

Dr. Simons announced the following appointments as committee chairmen: Dr. F. G. Benn, first vice president, scientific programs; Dr. C. E. Proshek, second vice president, entertainment; Dr. Gilbert Cottam, editing and publishing; Dr. S. Marx White, economics; Dr. Ivar Sivertsen, legal; Dr. A. S. Fleming, interprofessional relationships; Dr. C. W. Waldron, University relations; Dr. F. H. K. Schaaf, study of trends in medical practices; Dr. H. B. Annis, historical; Dr. T. A. Peppard, library and house, and Dr. G. D. Eitel, fellowship.

Kandiyohi-Swift-Meeker Society

The Kandiyohi-Swift-Meeker County Medical Society met at the Lakeland Hotel, Willmar, Minn., on October 27, at 6:30 P. M.

Dr. Martin Nordland of Minneapolis was the speaker for the evening, his topic "Practical Points of Surgical Lesions of the Neck." He also discussed points of interest from the clinics he attended on his recent European trip.

The Ladies' Auxiliary met at the same time.

Rice County Society

A meeting of the Rice County Medical Society was held in the Faribault Clinic rooms Thursday, October 1, at 7:45 P. M. Dr. A. W. Adson of Rochester addressed the Society on "The Diagnosis and Surgical Treatment of Spinal Cord Tumors."

West Central Society

Dr. A. L. Lindberg, Wheaton, was elected president of the West Central Medical Society at the regular October meeting of the society. Other officers are Dr. B. V. Bates, Browns Valley, vice president, and Dr. I. L. Oliver, Graceville, secretary.

Upper Mississippi Medical Society

The fall meeting of the Upper Mississippi Medical Society was held at Bemidji, Saturday, October 31, 1936. Dr. W. W. Will acted as master of ceremonies at the banquet in the Markham Hotel. The scientific program was as follows: Dr. O. E. Locken, Crookston, Speaker of House of Delegates, "Will the Gov-

ernment or the Patient Pay?" Dr. L. Strausman (Germany), Rochester, "State Medicine as Seen in Germany." Dr. E. G. Hubin, Deerwood, "Case History Tularemia with Pulmonary Complications." Dr. L. F. Richdorf, Minneapolis, "Mastoids in Children." Dr. Martin Nordland, Minneapolis, "Thyroiditis—Diagnosis and Treatment."

Minnesota Medical Officers Association

The fall meeting of the Minnesota Medical Officers Association was held at the School for Feeble Minded at Faribault on Monday, October 5, 1936.

Dr. A. R. T. Wylie read a paper and presented a clinic on "Feeble-mindedness."

Luncheon was served at the institution. In the afternoon a program was presented by the patients at the school and the Society made an inspection of the institution.

The following officers were elected for the coming year: Dr. D. E. McBroom, president; Dr. (Ethel R.) Beede, vice president; Dr. H. E. Hilleboe, secretary.

WOMAN'S AUXILIARY

Mrs. E. M. Hammes, *President*,
1456 Summit Avenue, Saint Paul
Mrs. A. A. Passer, *Editor, Press and Publicity*, Olivia

Hennepin County

The Woman's Auxiliary to the Hennepin County Medical Society held its first fall meeting Friday afternoon, October 2. The meeting was in the form of a tea and reception for new members and officers at the home of Mrs. Moses Barron, Minneapolis. The outlining of the year's program and a business session, with Mrs. W. Moir in the chair, concluded this part of the afternoon meeting. A most comprehensive year book has been published and each member was presented with a copy.

Musical selections by Mrs. Milch, cellist, Mr. Nicolai Bonelli, violinist, and Miss R. Anderson, pianist, preceded the tea.

New officers included Mrs. W. W. Moir, president; Mrs. Stephen Baxter, president-elect; Mrs. R. R. Cranmer, recording secretary; and Mrs. C. M. Larson, corresponding secretary. Mrs. J. S. Milton is the new press and publicity chairman.

Renville County

The Woman's Auxiliary to the Renville County Medical Society held its annual election of officers last May at the home of Mrs. A. A. Passer. Mrs. E. M. Hammes, state president, was a guest at the meeting and gave a report of the national meeting held at Kansas City. Mrs. R. C. Adams of Bird Island was named president to succeed Mrs. R. S. Madland of Fairfax. Mrs. G. H. Mesker of Olivia entertained the Auxiliary at her home the evening of October 7. Mrs. George Williamson of Saint Paul was present and outlined the program of entertainment for the Interstate Postgraduate Medical Association of North America held in Saint Paul, October 12 to 16.

HERNIATED EMPYEMA OF GALLBLADDER OPENED THROUGH SKIN INCISION

(Continued from page 741)

apex. Because of this condition, steps were taken to remove the patient from St. John's. The pneumonia had apparently cleared up some days before the picture was taken. Frequent questioning of the patient as to whether he had had the cough and expectoration for a long time always brought an emphatic denial. I found out a little later from his wife that he had been coughing and expectorating for three or four months.

The patient was last seen on February 23, and on February 24 was removed to another hospital as a county case, and died two days later. As I was ignorant of his death until after the body had been prepared for burial, I was unable to take advantage of his wife's permission (given a few days before his death, and in expectation of it) to hold a partial autopsy.

As stated before, the patient had undergone an operation twenty-one years ago. The attending surgeon kindly informed me that this was for an acute cholecystitis, and that the gallbladder was drained and three gall stones removed. He had never had any symptoms following the operation until a few weeks before he came to the hospital. The pain under the right costal arch, gradually increasing in intensity, was no doubt due to the gradual filling of the gallbladder with stones. The viscus finally becoming so distended that the portion of it nearest to the middle line (which was the point at which it was adherent to the subcutaneous tissues) pushed through a small post-operative hernia and showed as the mass which I opened. The distance from the tip of the xiphoid to the level of the middle of the protrusion was 3.25 cm. and the distance from the middle line of the abdomen to the middle of the protrusion 3.50 cm. The deepest part of the sac was downward and to the right.

The contents of the bladder were at first largely hydropic, later on becoming more like those of an empyema. The evacuation of the bladder contents, particularly the stones, cleared up the process as was shown by the presence, at the last, of perfectly clear bile and practically no drainage. The wound would undoubtedly have healed had the patient lived a little longer. Sixty stones were removed in all. It is believed that a case just like this (aside from the concomitant conditions) has never been reported, and because of this, it is reported in such detail.